



GOVERNMENT OF INDIA
MINISTRY OF CIVIL AVIATION
(COMMISSION OF RAILWAY SAFETY)



**RAILWAY ACCIDENT INVESTIGATION
REPORT**

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ON

**DERAILMENT OF T034 UP LUCKNOW-BOMBAY VT PUSHPAK EXPRESS
(DIESEL ENGINE HAULED) AT KM. 1256/0-1 BETWEEN ATA AND ORAI
STATIONS ON THE JHANSI-KANPUR SECTION OF JHANSI DIVISION
OF CENTRAL RAILWAY AT 11.08 HOURS ON 17.05.1994.**

VIEWS OF THE RAILWAY BOARD

Cause & Responsibility

The cause of the accident and responsibility therefore, as established by the Commission, are accepted.

Remarks & Recommendations

Para 9.1

Instructions have already been issued for inculcating the concept and culture of Zero-Missing-Fitting Gangs at all levels and in the gangs on main lines. Field staff have been counselled to understand the importance of ZMF. This is being viewed as a desirable feature of regular track maintenance. Separate instructions have already been issued for slowing down of traffic on deficiency of fittings.

Para 9.2 to 9.8

The Railway has explained the position to the satisfaction of the Commission.



SUMMARY

Date	:	17-05-1994						
Time	:	11.8 hours						
Railway	:	Central						
Gauge	:	Broad Gauge (1676 mm)						
Location	:	Km. 1256/0-1 between Ata and Orai stations on Jhansi-Kanpur section.						
Nature of accident	:	Derailment						
Train involved	:	1034 Up Lucknow-Bombay VT Pushpak Express						
Speed at derailment	:	91 kmph						
System of operation	:	Absolute Block System						
No. of tracks	:	Single Line						
Gradient	:	Level						
Alignment	:	Straight						
Weather	:	Clear						
Visibility	:	Normal						
Casualties	:	<table><tr><td>Killed</td><td>—3</td></tr><tr><td>Grievous injuries</td><td>—1</td></tr><tr><td>Simple injuries</td><td>—4</td></tr></table>	Killed	—3	Grievous injuries	—1	Simple injuries	—4
Killed	—3							
Grievous injuries	—1							
Simple injuries	—4							
Cost of damage	:	Rs. 31.55 lakhs.						
Relief arrangements	:	Satisfactory						
Medical attention	:	Satisfactory						
Cause	:	Distortion of track due to track disturbance caused by sectional permanent way gang working at site (at the time of accident) and also due to neglected and run down state of track.						



Persons held responsible

(A) PRIMARY

1. Shri Pati s/o Mathura, P. Way Mate, Gang No. 24.
2. Shri M.C. Shrivastava, P. Way Inspector/Orai.

(B) SECONDARY

1. Shri N.R. Gautam, P. Way Inspector/Kalpi.

(C) BLAMEWORTHY

1. Shri R.K. Shrivastava, P. Way Mistry/Kalpi.
2. Shri M.P. Sood, Assistant Engineer, Kanpur.
3. Shri A.K. Dadariya, Divisional Engineer (East)/Jhansi.

Important Recommendations in brief

- (1) Railway Board should constitute a committee of Advisers/Ex. Directors from engg. mechanical and safety directorates to conduct surprise checks on the implementation of "Zero Missing Fittings Gang" (ZMFG) on zonal railways, especially on CST-9/steel trough sleepered tracks.
- (2) An immediate survey of Jhansi-Kanpur section over CST-9 stretches should be made to ascertain rail seat wear as well as percentage of loose/missing keys and immediate action taken to insert oversized keys/saddle plates. Till the situation is normalised a speed restriction of 80 kmph should be imposed on all the CST-9 stretches on the above section.
- (3) Instructions contained in Central Railway's Accident Manual on "Joint measurements and observations" should be reiterated to all divisions, with a directive that no restoration work should commence till the seniormost official at site ensures satisfactory completion the above item.
- (4) Suitable video film coverage, wherever feasible should be arranged to cover all aspects of accident site towards helping the enquiry committee during investigation.
- (5) When accidents occur at a "work spot", the supervisory officials at site should be immediately dealt with under Disciplinary Rules. GM/C. Rly. should issue suitable instructions in this regard.
- (6) To ensure that p.way staff at the level of mate/mistry possess adequate acknowledgement of maintenance of short welded rails, the safety branch [through Asst.Engineer (Safety) & Safety Counsellors] on the division should carry out organised checks and take corrective measures wherever needed.
- (7) Central Railway Admn. should reiterate all the special instructions contained in the CRS's sanction for augmenting the capacity on Pushpak Express with 21 coaches and monitor their implementation.
- (8) All the rakes of Pushpak Express should be run with pantry cars without fail.
- (9) Chief Mechanical Engineer/NE Rly/Gorakhpur should issue instructions to C&W depot/LKO that secondary maintenance of 1033/1034 rakes should adhere to stipulations laid down in RDSO's Manual C-7103 (coaches for 110 kmph).

POH	: Periodic over haul
PWI	: Permanent Way Inspector
RCF	: Rail Coach Factory
RDSO	: Research, Designs & Standards Organisation
SM	: Station Master
SWR	: Short Welded Rail
TI	: Traffic Inspector
TRC	: Track Recording Car
TTE	: Travelling Ticket Examiner
TXR	: Train Examiner
USFD	: Ultra sonic Flaw Detector



ABBREVIATIONS USED

ADRM	: Additional Divisional Railway Manager
AEN	: Assistant Engineer
ALF	: Assistant Loco Foreman
ARME	: Accident Relief Medical Equipment
BBVT	: Station code for Bombay Victoria Terminus
BPC	: Brake Power Certificate
CE	: Chief Engineer
CEE	: Chief Electrical Engineer
CME	: Chief Mechanical Engineer
CNB	: Station code for Kanpur
COM	: Chief Operations Manager
C. Rly	: Central Railway
CRS	: Commissioner of Railway Safety
CSTE	: Chief Signal and Telecommunication Engineer
CTR	: Complete Track Renewal
CTXR	: Chief Train Examiner
CWR	: Continuous Welded Track
C&W	: Carriage & Wagon
DEN	: Divisional Engineer
DSO	: Divisional Safety Officer
GM	: General Manager
G. No.	: Gang Number
G&SR	: General and Subsidiary Rules
HOD	: Head of Department
HQ	: Headquarter
ICF	: Integral Coach Factory
IOW	: Inspector of Works
IRPWM	: Indian Railway Permanent Way Manual
JHS	: Station code of Jhansi
Kmph	: Kilometer per hour
LJN	: Station code for Lucknow Junction
LKO	: Station code for Lucknow
LWR	: Long Welded Rail
NE Rly	: North Eastern Railway

GOVERNMENT OF INDIA
MINISTRY OF CIVIL AVIATION & TOURISM
(COMMISSION OF RAILWAY SAFETY)

From:

The Commissioner of Railway Safety,
Central Circle,
Churchgate Station Bldg. Annexe,
Maharshi Karve Road,
Bombay-400 020.

To:

The Chief Commissioner of Railway Safety,
Ashok Marg.
Lucknow-226 001.

Sir,

In accordance with Rule 4 of the "Statutory Investigation into Railway Accidents Rules, 1973" published by the then Ministry of Tourism & Civil Aviation, I have the honour to submit the Report of my statutory inquiry into the derailment of 1034 Up Lucknow-Bombay VT Pushpak Express (diesel Engine hauled) which occurred at km. 1256/0-1 at 11.08 hours on 17-05-94 between Ata and Orai stations on the Jhansi-Kanpur section of Jhansi division of Central Railway.

1.2 Inspection and Inquiry

1.2.1 I was informed of the accident at about 12.30 hours on 17-05-94 by the Chief Safety Officer, Central Railway, Bombay VT. I left by a special train which left Bombay VT at 14.05 hours in the company of General Manager, Central Rly and other HODs and reached accident site at about 09.45 hours on 18-05-94. After reaching the site, I inspected the various features of the accident, while the restoration work was in the final stages.

1.2.2 In the company of General Manager, Central Rly and Chief Medical Director, Central Rly, I visited the Govt. Civil Hospital at Orai where some of the injured passengers had been admitted earlier but had been discharged prior to our arrival. We had discussed with the hospital authorities about the medical attention bestowed on the injured passengers and found the same adequate.

1.2.3 The Statutory Inquiry was held at Orai on 18-05-94 and continued at Jhansi from 19-05-94 to 21-05-94. The inquiry was attended by the following Senior Admn. Grade Officers:—

Shri S.C. Gupta

: Chief Track Engineer,
Central Rly, Bombay VT.

Shri Piyush Bahadur

: Chief Rolling Stock Engineer,
C. Rly, BB VT.

Shri R.K. Rao

: Addl. Divisional Rly Manager,
C. Rly, Jhansi.

Assistance was rendered by all the other divisional officers of JHS division & their staff

The holding of the inquiry was publicised by inserting advertisements in the National and Local newspapers. The Civil & Police authorities were also duly notified. 1.2.4 During the inquiry, the evidences of 41 witnesses were recorded. None from the public had come forward for tendering evidence.

1.3 The accident

1.3.1 1034 Up Lucknow-Bombay VT Pushpak Express consisting of 20 passenger coaches and hauled by WDM/2 diesel engine departed from Kanpur at 09.35 hrs and had run through Kalpi at 10.56 hrs and passed through Ata at 11.07 hrs. After the train had passed through the Advanced Starter signal at km. 1256/0-1, the driving crew and an Asst. Loco Foreman of JHS diesel shed (who happened to travel on the foot plate) felt a severe jerk and emergency brakes were promptly applied. The engine came to a stop after travelling about 300 mts. The locomotive had its front trolley on rails while the rear trolley had derailed. The first coach had derailed towards the right side (in the direction of motion). From second coach onwards till the 14th coach from engine, all the coaches had derailed on the left and taken a diverted alignment on the ground with the farthest coach at a distance of 18.0m from the existing alignment of track. [Vide Annexure-I(c)].

The right hand rail at the accident site from the point of drop was more or less in position though kinky and bent at several places due to accident consequences. However, the left hand rail had given way and broke into several parts with one piece lying on the right side of track while another portion had taken a complete 'S' shape and lying perpendicular to the track. One more portion of rail about 15 m long had pierced from the trough floor of 5th coach from engine (a sleeper coach) and passed through the above coach near cabin berth no. 25-32 and travelled through the lavatory portion of the coach into the next coach (6th from engine) and came out piercing through the roof of the 6th coach (vide Annexure-II). One welded joint was also seen to be broken afresh, while some of the fish-plated ends were having either one or two bolts or no bolts at all.

1.3.2 At the time of the accident, it was a very hot sunny day and the visibility was normal. 1034 Up was running at a speed of 30 kmph, below the maximum permissible speed of the section.

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1.4 Casualties

I regret to report that as a result of this accident, 3 passengers were killed (2 on the spot and 1 later in the Civil hospital, Orai) and 5 were injured, out of which I was grievous.

1.5 Passenger occupation

Against a carrying capacity of 1340, the train had an approximate occupation totalling 1275.

II. RELIEF MEASURES

2.1 Intimation

2.1.1 The first information about the accident was conveyed by the cabinman, 'A' cabin/Ata to Station Master, Ata, who in turn communicated to the section controller at 11.10 hrs. At that time, coincidentally ADRM/JHS and his branch officers were in the controlroom and there was no delay in communicating with all branch officers in the division. The civil and police officials at Orai and Kalpi as well as at Ata were promptly informed. The railway doctor at Orai as well as civil doctors at Orai and Kalpi were also informed without delay.

2.1.2 The details regarding the time of ordering, starting and arrival of medical vans and break-down trains are detailed below:

Sl. No.	Description	Time of ordering	Time of departure	Time of arrival at site	Remarks
1.	Medical Van, Jhansi.	11.11	11.50	14.05 (Ata)	(Delay of departure from JHS yard is due to shortage of power)
2.	Medical Van, Kanpur.	11.20	12.26	13.40 (Ata)	—
3.	Breakdown train, JHS.	11.11	12.18	14.57 (Orai)	—
4.	Breakdown train, CNB.	11.20	12.58	14.55 (Ata)	—

2.2 Medical attention

2.2.1 The first medical attention to injured passengers was rendered by civil doctors from nearby areas adjacent to Ata station. Asst. Medical Officer/C. Rly/Orai had also attended to a few injured passengers who had come to his health unit at Orai. Some of the injured passengers were later admitted to Orai civil hospital where adequate medical attention was made available.

2.2.2 Out of the 3 dead bodies, 2 were identified at site itself and the other one later by their kith and kin.

2.3 Restoration

2.3.1 As there was no damage to the six rearmost coaches, the same could be taken to Ata yard. As regards the passengers, since the main highway was situated close to the track, most of the passengers had left for Orai by road transport arranged by civil & police officials while the rest had gone towards Kalpi and Kanpur. The rake of 1531 Dn passenger (Jhansi to Kanpur) was terminated at Ait and worked as relief train to Orai to bring the stranded passengers to Jhansi. Similarly, 1143 Dn rake (Chapra mail from Gwalior to Chapra) with 13 coaches was terminated at Jhansi and sent to Orai to bring the affected passengers to Jhansi. The same rake was worked as duplicate 1034 Up Pushpaka express for Bombay bound passengers, after transhipping all the passengers from the 1531 dn rake. 1144 Up Chapra mail from Chapra to Gwalior was terminated at Kalpi and worked as relief spl. cum 1143 Dn for Kanpur/Lucknow/Gorakhpur/Chapra bound passengers. A spl. relief train was also run from Jhansi to Kanpur via Banda to clear the extra rush.

2.3.2 Interruption to passenger traffic

As a result of this accident, one mail/express train was cancelled, two nos. terminated enroute and ten nos. diverted. Three passenger trains were terminated enroute and one no. stood cancelled.

III. COMPOSITION OF TRAIN AND DAMAGE

3.1 Locomotive

1034 Up was hauled by diesel engine WDM/2-17828 built at Diesel Locomotive Works, Varanasi and commissioned on 24-03-1979. It is based at Jhansi loco diesel shed (C.Rly.) and had its last POH on 18-09-1990, and last 3 yearly schedule on 22-01-1994. The last quarterly and fortnightly schedules were done on 24-04-1994 and 11-05-94. It had earned 4.95 lakh kms after its last POH.

3.2 Coaches

The marshalling order of the 20 coaches in the passenger train from the engine was as under :

Sl. No.	Owning Rly	Coach No.	Code	Type	Year built	POH date	Return date
1	2	3	4	5	6	7	8
1.	CR	92108	SLR	ICF	1992	29-09-93	10/94
2.	CR	8420	GS	RCF	1987	05-05-94	6/95
3.	CR	92394	GS	ICF	1992	01-10-93	11/94
4.	CR	92378	GS	ICF	1992	28-03-94	4/95
5.	CR	9118	WGSCN	ICF	1974	18-01-94	2/95
6.	CR	91307	WGSCN	ICF	1991	19-04-94	5/95
7.	CR	3466	WFC	ICF	1990	26-02-94	4/95
8.	CR	8194	WGAC	ICF	1981	24-06-93	7/94
9.	CR	91252	WGSCN	ICF	1991	01-11-93	12/94
10.	CR	91208	WGSCN	ICF	1991	16-10-93	11/94
11.	CR	91207	WGSCN	ICF	1991	16-10-93	11/94
12.	CR	91279	WGSCN	ICF	1991	04-11-93	12/94
13.	CR	91240	WGSCN	ICF	1991	04-10-93	12/94
14.	CR	91236	WGSCN	ICF	1991	04-10-93	12/94
15.	CR	7535	WGSCN	ICF	1990	26-02-94	4/95
16.	CR	91255	WGSCN	ICF	1991	04-10-93	12/94
17.	CR	91229	WGSCN	ICF	1991	27-09-93	12/94
18.	CR	92456	GS	ICF	1992	08-03-93	5/94
19.	CR	92425	GS	ICF	1992	08-03-93	5/94
20.	CR	92107	SLR	ICF	1992	30-10-93	12/94

3.3 Damage

3.3.1 Damage to diesel locomotive

The Damages were minor, which include the right side rear buffer cracked and long hood side cattle guard damaged. Cost of damage to loco is about Rs. 10,000/-

3.3.2 Damages to coaches

The damages were quite heavy as can be seen from the table below:

Coach No.	Disposition	Brief description of damage
1	2	3
92108 SLR	LTLR wheel outside track. LTLL wheel inside track. LTTT wheel inside track. LTTL wheel outside track. TTTR inside track. TTLL wheel outside track. TTTR wheel outside track. TTTL inside track.	Hit mark on trailing left buffer face.
8420 GS	Derailed near the track. T. Wheel of LT and TT worked away.	Both the trolley's out of alignment, squareness disturbed. leading right buffer dropped down two bolt threads worked out. one bolt sheared off, one bolt sheared off found in housing. TL foot-board bracket bent. Dash pot guide missing.
92394 GS	Both the trolley's found in derailed condition away from the track formation. Coach found in tilted position towards left hand side. Coach found lying oblique to the track. TT right hand pair of wheels lifted up from the ground.	Both the trolley's out of alignment, squareness disturbed and damaged badly. Both side end panel damaged. Right side rear buffer damaged. TR buffer found inside panel.
92378 GS	Both trolley's in derailed condition lying away from track formation.	Both the trolley's out of alignment, squareness disturbed. LR side, end panel damaged. TR side foot board damaged.
9118 WGSCN	Both the trolley's found in derailed condition & away from the track formation. Coach was found tilted towards left hand side.	Both the trolley's out of alignment, squareness disturbed. TR side buffer damaged. Trough floor pierced near door way, panel damaged. Lavatory end and panel damaged. Bolster plank of LT found broken. Reservoir damaged. Rail piece pierced through trough floor near berth No. 25-32 and coming out through wash basin and TR lavatory, entering in LR lavatory of coach No. CR 91307.
91307 WGSCN	Both trolley's in derailed condition and away from track formation.	Rail piece found pierced through LR lavatory and coming out of ceiling. Both the trolley's out of alignment, squareness disturbed.

1	2	3
3466 WFC	Both the trolleys found derailed and away from track formation.	Both the trolleys out of alignment squareness disturbed.
8104 WGAACW	Both trolleys were derailed lying away from track formation.	Do.
91252 WGSCN	Both the trolleys found in derailed condition and away from track formation.	Do.
91208 WGSCN	Both the trolleys derailed & coach lying near left side of track formation.	Do.
91207 WGSCN	Both the trolleys found derailed on track formation.	Do.
91279 WGSCN	Both the trolleys found in derailed condition on track formation.	Do.
91240 WGSCN	Both the trolleys derailed with all four pairs of wheels inside the track.	Do.
91236 WGSCN	Leading trolley found derailed with wheels inside the track trailing trolley found on rails.	Do.
7535 WGSCN	Coach on track	No damage.
91255 WGSCN	Coach on track	No damage.
91220 WGSCN	Coach on track.	No damage.
92456 GS	Coach on track.	No damage.
92425 GS	Coach on track.	No damage.
92107 SLR	Coach on track	No damage.

The damages to the above coaches work out to Rs. 26.45 lakhs.

3.3.3 Damage to P. way

About 370 mts. track length was completely damaged with 100 mts length partially damaged, the cost of which works out to Rs. 5 lakhs.

3.3.4 There were no damages to any other fixed assets.

3.3.5 The total cost of damage to railway assets is as under :

P. Way	Rs. 5.00 lakhs
Carriage & wagon	Rs. 26.45 lakhs
Locomotive	Rs. 0.10 lakhs
Total	Rs. 31.55 lakhs

IV. LOCAL FEATURES

4.1 The section and the site

4.1.1 The accident occurred on the single line section between Ata and Orai stations which are located in the Civil District of Jalaun in Uttar Pradesh State. The direction of line is North-East to South-West.

4.1.2 The alignment at the site of accident is straight and gradient is level. The track is on an embankment about 1 metre high and the formation consists of clayey soil mixed with kankar. (The formation is stable). The permanent way consists of 90R rails 42' feet long laid in 1957-58 welded into SWR laid on CST-9 sleepers (1957-58) to M+4 density. Sandstone ballast of about 125mm below sleepers is available.

4.1.3 The kilometrages of various points mentioned in the report reckoned from Bombay VT station are as under :

Bombay VT	:	00.00
Jhansi	:	1127.72
Orai	:	1241.47
ACCIDENT SITE	:	1256/0-1
Ata	:	1256.97
Kanpur	:	1347.40

4.1.4 The track at this location runs through open, cultivated and plain land on either side. The section falls under Zone-IV of LWR manual vig. region having maximum rail temperatures ranging from 71° to 76°.

4.2 Signalling and system of working

Trains are worked on absolute block system and the section is controlled by single line Neale's Block Instruments. Ata is 'B' class stn. with interlocking to Std-III equipped with Lower Quadrant Mechanical Signalling while Orai is a 'B' class stn. with Std-I interlocking. Two end cabins with lever frames are available at both the above stations.

The control office is situated at the divisional headquarters at Jhansi and a controller is in-charge of the section from Jhansi to Kanpur. The track is under the jurisdiction of P. way Inspector/Orai and Asst. Engineer/Kanpur. The maximum permissible speed of the trains in the section is 100 kmph.

V. SUMMARY OF EVIDENCE

5.1 There were 41 witnesses who tendered evidence and none of them was public. The statements of those relevant to the accident are summarised below.

LOCO RUNNING OFFICIALS

5.2 *Shri Ayodhya Prasad*, Driver 'A'/JHS was the driver in charge of the ill-fated 1034 Up on 17-05-94. In his statement he had mentioned that after passing Ata at 11.10 hrs saw a permanent gang working on track and when his engine had passed the spot where they were standing he felt a sudden jerk and when he looked back he saw a lot of dust and immediately sensing apprehension applied emergency brakes and felt the rear bogie of his engine oscillating and felt several coaches derailing behind. The train was running at a estimated speed of 75 kmph.

Answering questions, he stated that he had put in 32 yrs of accident free service in proof of which, he had received several rewards/certificates in the past, records of which were produced during examination. He has been working mail/express trains for the last 4 yrs out of which 3 yrs had been on 1033/1034. He was asked whether he is aware of any special instructions issued in connection with running of 1033/1034 with 21 coaches, for which he replied in the negative. He was not aware that this train should always run with the diesel loco in short hood leading condition, failing which there should be a speed restriction of 90 kmph. Prior to this

trip, he worked 1033 Dn on 16-05-94 from JHS to CNB and signed 'off' at 23.25 hrs and reported for duty at CNB at 09.08 hrs on 17-05-94 (rest for about 9 1/2 hrs). Asked about the condition of his loco WDM/2 17828, he stated that he found no deficiencies nor there were any defects reported by the previous drivers. From CNB till Orai, 1034 Up has no scheduled stop and 1034 Up was given through signals from CNB at all stns. He stated that after km. 1298, there was no speed restriction. As regards vacuum levels on his engine it had been steady at 50 cms (less than 53 cms stipulated).

While approaching the Advanced starter at Orai, he saw the gang about 100 meter ahead of the signal and was constantly whistling cautioning the gang to get away from track. He saw the gang from starter at Ata and remembered to have seen about 6 or 7 of them. He could not say as to what exactly they were doing, and he did not get any hand signal from them nor any engg. indication such as detonator etc. He did not observe any obvious buckling or distortion of track when the train passed the work spot at 75 kmph. He was also not cautioned about any track defect by his Asst. or by Asst. Loco Foreman/JHS (who was on the foot-plate). He remembered the spot of gang working at km. 1256/0-1. He was asked whether the spot of accident was always a bad riding spot from his earlier experience, for which he stated that track on Kalpi-Orai section is good and never gave any bad riding in the past. He also stated that no telecommunication arrangement was available between him and the guard on 1033/1034 rakes.

5.3 Shri Shambhoo Dayal, Asst. driver of 1034 Up had more or less repeated the same sequence of events leading to derailment as stated by his driver at para 5.2 above.

Answering questions, he stated that he is working for the last 8 yrs as Diesel Asst. at JHS and has been working on 1033/1034 a no. of times and hence he is familiar with the JHS-CNB section. On the day of accident, he did not find anything abnormal from CNB to Ata and after passing Ata Advanced starter he felt a jerk after passing a work spot where a p. way gang was working. He described the jerk as severe and felt as if the track had been opened out and rail was totally free. He did not notice as to what exactly the gang was doing but found ballast opened out in several sleepers though he could not remember as to how many sleepers had been opened out. He also stated that no hand signal was given by the gang to his train. After getting the jerk, he looked back and found the second coach of the train getting derailed and tilted raising a cloud of dust. He then shouted to his driver and both of them applied the emergency brakes. The engine came to a stop within 300 to 350 meters from the point of application of brakes. After the engine stopped he went ahead and protected the track by putting detonators as per instructions given by the ALF and his driver. He stood at a point 1 1/2 kms ahead of engine for nearly 4 1/2 hrs till the ARME/JHS came to site. He could not remember to have seen any gang men after the accident nor did he observe the track affected by the accident. In his opinion the conditions of track on CNB-JHS section is quite poor leading to perpetual inferior riding.

5.4 Shri Mewa Ram, Driver (goods)/JHS was working 1532 CNB to JHS passenger on 17-05-94. His train left CNB at 5.15 hrs and arrived Ata at 08.20 hrs and left at 08.26 hrs. (His train was the last one to pass the above section prior to 1034 Up). His train reached Orai at 08.41 hrs. He stated that the running on Ata-Orai section was normal and did not feel any jerk due to poor riding spot.

He has been working on CNB-JHS section as driver from 1987 onwards and stated that the track is generally satisfactory except at isolated locations and at times speed restrictions are imposed by engg. officials for which he is issued the suitable caution order. He stated that when the train left Ata at 08.26 hrs he did not come across any gang working near advanced starter.

LOCO MAINTENANCE OFFICIALS

5.5 Shri S.N. Bajpai, Asst. Loco Foreman/Diesel Shed/JHS was on monitoring duty, monitoring the performance of loco no. 17828. He boarded the foot-plate at CNB. When the train was passing through Ata stn at 11.10 hrs he had seen the signal ahead viz. starter and Advanced

starter through and after the driver had taken the token, he saw a p. way gang working about 300m ahead, near the Advanced starter signal. He stated that no caution order had been given to the train nor any hand signals exhibited by the gang to 1034 Up train to observe any engg. restrictions. On passing the gang he felt a severe jerk and when he looked back, found to his dismay several coaches derailing behind. When the train stopped he went back with the Asst. driver and started noting down the damages and after some time he sent back the Asst. to the front of engine to protect the track ahead. Thereafter, he went to Ata 'A' cabin and informed the SM/Ata to inform Control for breakdown/medical relief trains. When he came down from the cabin, he saw a p. way staff by name Babu Lal, keyman of G.No. 24 (see para 5.19 below) who had informed him that G.No. 24 was working at km. 1256/0-1, the spot of derailment.

Answering question, he stated that he came to JHS diesel shed in 1976 as a fitter and subsequently became ALF about 8 yrs back. His nature of duties includes besides turning out locos in the shed, periodic monitoring of locos in the field (he does about 6 to 7 trips per month). He stated that he monitors the performance of locos only and is not involved in counselling the running staff since they are not under his control. Regarding WDM/2 17828, he had last monitored the loco on 14-05-94 by 1034 Up from Orai to JHS and found its functions satisfactory except the "hot engine alarm". On 17-05-94, he stated that the driver of 1034 Up tested the brake power after leaving CNB at Govindpuri and found the same OK. He stated that there was a difference in speeds indicated by the mechanical and electrical speedometers viz. the former indicating 20 kmph in excess of the electrical one.

As regards p.way gang he saw about 6 to 7 gangmen working, 2 to 3 on the right side and the rest on left side. He found them busy attending to the rail-joint, bending down in the process. He did not find them doing any oiling/greasing of joint, though he could not state exactly what they were doing at the joint. He did not find them after the accident when he walked back towards the rear of train towards Ata cabin. When he met the keyman Babu Lal of gang no. 24, the latter informed him that he was doing keyman's patrolling at km. 1256/4-5, while his gang no. 24 was working at km. 1256/1. The keyman could not explain as to what work is being done by his gang. Thereafter, Shri Bajpai took a cycle and went to Ata stn. He met one officer from RDSO (vide para 5.31 below) who directed him to go to site and take particulars of the dead bodies. Afterwards he did not see the officer from RDSO again. He stated that while he was busy attending to passengers and their needs, the Civil and Police authorities had come and took over charge of the situation.

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Asked about the site of accident, as to what he observed, he stated that there was lot of damage to track with a no. of components of rolling stock also strewn all over. He found a buffer lying near the right rail, but away from it. He did not examine it carefully to see whether there are any derailment marks on it or not. He stated that he found the right rail continuous throughout though twisted and kinky in its alignment but the left rail had broken into several parts.

5.6 Shri C.P. Bhatia, Diesel Foreman/JHS is working in Jhansi diesel shed for the last 17 yrs and was the supervisor when the diesel loco no. WDM/2 17828 was turned out after trip examination on 14-05-94. He also gave details of the work done on the loco during the last 3 yearly schedule (heavy schedule) on 22-01-94. With regards to undergear examination, all the six wheelsets had been changed and measurements of wheel profiles taken, which were at 1092 mm (nominal). He stated that though normally wheel sets are not changed in 3 yearly schedule, such a change was warranted since wheel sets had reached condemning dimensions. Further on both bogies, almost all springs, axle boxes were changed and bogie frame overhauled.

When the above loco was examined at Loco shed, JHS on 19-05-94 after the accident, he was asked to explain as to why some of the critical dimensions were not as per specifications. In particular, axle box lateral clearance was 0.639" on wheel set 1 and 0.839" on wheel set 3 and 0.506" on wheel set 6 against the prescribed limit of 0.5". As regards wheel gauge, on wheel sets 1 & 6, the measurements were beyond permissible by 0.03mm and 0.83mm. He explained that the loco had undergone quarterly examination on 22-04-94 and the clearances were well within limits

as per records kept. He felt that the extra clearances had arisen due to consequential damages of accident. There was less oil inside bearers on right side on both trolleys and this was corroborated by the fact that there was oil spillage at site of accident. It was also noticed that bronze liners in both the side bearers were found in broken condition, which Shri Bhatia felt was due to accident damages. As such his main contention was that the dimensional tolerances which had exceeded the prescribed limits as well as the broken components had taken place after the accident.

5.7 Shri P.S. Malhotra, Divisional Mechanical Engineer (Diesel)/Jhansi diesel shed in his statement mentioned that WDM/2 locos are maintained as per the instructions contained in the RDSO's Maintenance Instruction Manual No. MP-MI-71/78. He gave certain explanatory observations on the measurements of the loco WDM/2 17828 taken by a team of 3 JA Grade Officers as under :

- (a) Wheel gauge : Wheel no. 1—1596.595mm
 Wheel no. 2—1595.83mm
 Wheel no. 3—1596.70mm
 Wheel no. 4—1596.32mm
 Wheel no. 5—1596.32mm
 Wheel no. 6—1596.95mm

As per para 3.5.2.2 of the above RDSO's manual, the dimensions should be $1596 \pm 0.5\text{mm}$. As such he felt that only on wheel sets 3 & 6 the average values (average of 4 measurements on equal spacing on the periphery of wheel, as per instruction manual) are slightly above the permissible values.

(b) Lateral clearances

Shri Malhotra produced extracts of para 3.5.2.3 of RDSO's manual mentioned above as well as instruction manual of 'ALCO' MI No. 16023/5292. As per the above instructions, he clarified that lateral clearance is not to be considered as measured on individual axle box, but it is to be considered on each axle as a whole. The limits given in ALCO manual for front and rear axles are 0.25" to 0.50" and 1.00" to 1.25" for the central axle. The clearances of axles 1, 3 & 6 were 0.639", 0.834" & 0.506", which were more than 0.5". He submitted that the clearances were more due to liners having been dropped, due to weld metal (fixing the liners to the frame) having given way at accident site.

(c) Right hand side buffer at rear end

Height was 1025mm against 1030mm which was due to some of the nuts of buffer missing and also due to fresh crack at top of buffer, which made it to droop. He attributed this to the consequential effect of the accident.

(d) Less oil and side bearer pans

Shri Malhotra stated that the loco was due monthly schedule on 17-05-94, when oil is topped. Even though oil was short inside bearers he felt they were not starved of it and there was enough to give the necessary lubrication. He also submitted that oil had spilled out at site of accident while doing the rerailing operations of the locomotive.

CARRIAGE MAINTENANCE OFFICIALS

5.8 S/Shri L.C. Gautam, Divisional Carriage Inspector/JHS and **G.C. Shrivastava**, Chief Wagon Supdt./JHS had gone to the site of accident along with medical van. Both of them were associated with joint measurements of the accident site. In their team PWI/Orai (witness at para 5.28 below) TI(Br)/JHS (witness as para 5.16 below) were also associated. They were specifically asked as to why joint measurements were *not* signed by PWI for which they stated (verbally) that the PWI refused to sign since he was not in agreement with them.

5.9 *Shri P.K. Saxena*, Carriage Depot Officer, NE Rly, LKO stated that he is in charge of C&W depot at NE Rly, LKO which is carrying out the secondary maintenance of 1033/1034 rakes. There are 7 MG and 2 BG rakes receiving primary maintenance every day and rake of 1033/1034 is the only rake being given secondary maintenance, which is given by one of the two gangs on the BG.

As per records kept at the depot, the rake of 1034 of 16-05-94 reached very late at LJN on 17-05-94 viz. at 01.05 hrs and pit attention was given from 02.30 to 06.30 hrs and 1034 Up left LJN at 07.10 hrs. He stated that normally, the rakes of 1033/1034 receive only day maintenance but on 16th/17th the rake had to be examined only during the early morning hours due to delayed arrival at LJN. The gang in charge consists of 1 CTXR, 36 skilled and unskilled staff. He submitted that the above gang was sufficient and there were no problems of spares. He stated that proper facilities including 3 tier pits having welding facilities and vacuum exhauster facilities are available.

The records of maintenance done on 17-05-94 on the rake of 1034 Up were gone through in detail for all the coaches and in particular reference to coach nos. 8420, 92394 and 92378 (placed 2nd, 3rd and 4th from engine). He referred to the records kept on the above coaches and brought out the details of cylinders, piston stroke, 'A' dimension of slack adjuster etc, which are needed from safety view point. He also brought certain records of repairs done to the above coaches such as dash pots safety bracket bolt tightening on coach no. 8420, truss bar safety bracket bolt recoupment on 92378. He submitted that all the above 3 coaches were attended properly and there were no deficiencies. He also stated that on coach no. 91279 (which was 12th from engine) brake beam hanger pin had worked out, which had been replaced. He was asked whether he is aware of the instructions that rakes of 1033/1034 are to be kept to standards mentioned in RDSO's manual No. C-7103 (which is meant for 110 kmph coaches, even though Pushpak express runs at a max. speed of 105 kmph only). He stated that he was not aware of any such instruction. The rake when it left the shed had vacuum levels of 55cms/50cms (first and last coaches) and at LJN station had 50cms (engine) and 45 cms (in SLR). He was shown the BPC issued by TXR/LJN and asked as to why the same is not machine numbered. He stated that on NE Rly, machine numbered BPC's are in use for goods trains though not in vogue for passenger trains. He could not however give a logical explanation on this. He submitted that normally in 1033/1034 rakes, important items such as DA/QA valves, slack adjuster etc were always made available and the rakes were not allowed to leave the depot with any deficiency on these items. He however admitted that there have been instances of DA valves not functioning on the above rake, even though they are available, and allow the rakes to go with non functional DA valves, since the train is scheduled to run at 105 kmph only.

5.10 *S/Shri Mangli Prasad*, Chief Train Examiner and *S.C. Bajpai and Ram Swarup*, Fitters (all from LKO CNW depot/NE Rly) had given statements of the work done by them on the rakes of 1034 Up in the early morning of 17-05-94 (which had been covered under para 5.9 above).

5.11 *Shri R.K. Mishra*, Sr. Divisional Mechanical Engineer, JHS in his statement gave a brief account of the work done by him from the time he arrived at site by the medical van at 14.20 hrs on 17-05-94. After rendering the requisite help towards rescue of two passengers who died (due to rail piercing through their body), he had taken part in joint observations w.r.t. track and rolling stock (discussed in para 7.0 below).

TRAFFIC OFFICIALS

5.12 *Shri B.N. Gupta*, Station Master/Ata was on 8/17 hrs duty on 17-05-94. 1034 Up passed through his station at 11.07 hrs and at 11.09 hrs cabinman 'A' cabin Shri Tejram informed him of the mishap and he promptly informed the control at 11.10 hrs requesting for arranging breakdown/medical relief trains. Immediately thereafter he informed local police
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and civil doctors. At 11.30 hrs he went to site as per instructions given by Asst. Optg. Manager/JHS and found gang tools lying at km. 1256/0, but did not find any gangman at site. He found rails without full complement of fish bolts. He was also informed by Tejram, cabinman that gang no. 24 was working at km. 1256/0. He found sleepers opened out at site. At 11.30 hrs, one private doctor had come at site and he helped him in attending the injured passengers as well as to tranship them to hospital at Orai.

Answering questions, he stated that he has been working at Ata for the last 1 1/2 years and stated that there is no caution order at Ata yard and there is a restriction of 30 kmph between Ata and Orai at km. 1241-42. Normally, express trains run through his station at 80 kmph and on that day he felt that 1034 Up was passing at 75 kmph. At the time of passing the train, his pointsman had gone ahead for handing over the token and his second pointsman was away from HQ (on promotional test) and hence the train was observed by him from the platform side only. He however stated that no abnormality was noticed by him on the rake of 1034 Up. He stated that at 11.20 hrs, one keyman Babu Lal came to stn and informed him that he was on patrolling duty and did not know anything about the accident. At 11.30 hrs DEN (East)/JHS (witness at para 5.30 below) came to Ata stn and he left the stn after informing the DEN, along with two pointsmen. As stated earlier, at Km. 1254/0-1 he saw gang tools such as phowrahs, crowbars etc lying in a nullah about 5 mts from track, but there was no trace of gangmen nearby. He was informed by Tejram, cabinman (witness at para 5.13 below) that p. way gang was working at the accident spot and one mate and 4 gangmen were available. The cabinman told Shri Gupta that one gangman Ramsumer came to his cabin after the accident and informed that he had warned the mate that track got misaligned during work and should not be allowed for traffic. However, Shri Gupta stated that the above gangman was not immediately available for his questioning. He also informed that his pointsman Shri Viswanath Singh (witness at para 5.14 below) had met the mate of the gang near the stn name board location when he had admitted that the mishap was due to the mate's fault. When he returned to stn from site at 11.50 hrs there was a large no. of public who had gathered in his room and he was attending to their requirements including a no. of telephone calls. He recalled that one officer from RDSO/LKO who was travelling with his family (vide para 5.31 below) had also come to the stn and gone after sometime.

5.13 *Shri Tejram*, Leverman 'A' cabin, Ata was on duty from 8 to 20 hrs on 17-05-94 and stated that after 1034 Up passed his cabin within a minute he heard a loud sound and saw coaches of 1034 Up derailing. He immediately informed SM/Ata (witness at para 5.12 above). After sometime, one gangman of G. No. 24 Ramsumer by name (witness at para 5.23 below) came to his cabin and said that he warned the gang mate not to do the work without caution order, but the mate did not listen to his warning. In the process, Ramsumer wailed that he "was also in trouble".

Answering questions, he informed that when 1034 Up was passing his cabin, he had exchanged signals and he found nothing unusual about any rolling stock. He stated that gangman Ramsumer (who is living near his rly quarter at Ata and hence well known to him) came to the cabin running within 2' of the mishap. He also saw mate & gangmen taking their cycles parked nearby and running away. [At this stage, Ramsumer gangman was called for a confronted inquiry and asked as to what exactly he told Shri Tejram. Ramsumer stated that he only uttered that "the gangmen and their families are finished" and nothing else. He denied saying that he warned mate etc. as stated in previous para]. However, Tejram informed later that Ramsumer was not telling the truth during the above confrontation. He had also seen the p. way gang of 6 or 7 staff working at km. 1256/0.

5.14. *Shri Vishwanath Singh*, Pointsman, Ata was working as Leverman in 'B' Cabin on 8 to 20 hrs, duty. After 1034 Up passed his cabin and within a couple of minutes there was a ring on the group phone from 'A' cabin to SM/Ata which he also attended and learnt about the accident. He was immediately called to come to stn by SM/Ata. On reaching stn premises

he was instructed by SM to go to site and find out full details. While he was going towards the spot he saw the mate of p. way gang Shri Pati (witness at para 5.25 below) and asked him as to what had happened. The mate just said "don't ask now, the fault is mine". He went away without saying further. Shri Singh further walked towards the site and noted further details regarding gang tools etc. lying at site but he did not see any gangmen nearby. He also saw a no. of sleepers opened out. He thereafter helped several passengers in taking out their luggages and remained at site.

(When he was confronted with the p. way mate Shri Pati about what the mate told him, Pati flatly denied having made such a statement. Later Shri Singh swore upon God that Pati is telling a lie).

5.15. *Shri N. K. Awasthi* : Guard of 1034 Up stated that after the train had passed Ata 'A' cabin at about 11.10 hrs. he felt a severe jerk. The vacuum in his brake van dropped down and when he looked out a lot of dust had arisen obstructing his view and the train had stopped. He got down and after passing 6th coach from rear saw the wreckage of several derailed coaches. He met the conductor and after ascertaining the details when to the engine where he learnt that the Asstt. had been sent ahead for protecting the train. Thereafter, he went to Ata stn. to give details to SM/Ata. At the stn. he saw the Director/RDSO (witness as para 5.31 below) who gave him instructions to take details of the dead bodies. Some private doctors had come by that time and he went along with them to the site to render assistance to the passengers. While walking towards the site he saw some gang tools left behind but did not see any gangmen nearby. He also saw a few cycles left near the 'A' cabin (belonging to the gangmen).

5.16. *Shri P. C. Lumba* : Traffic Inspector (Br)/JHS got a message at 12.20 hrs. on 17-05-94 about the mishap and immediately rushed to JHS stn. By that time the breakdown train had already left and he took a bus and reached the site of accident at 16.30 hrs. At the site, he was involved in joint site observations along with other supervisors and the conclusion was arrived at fixing the responsibility on engg. deptt. However, the PWI/Orai refused to sign the joint measurements.

Answering queries, the team started measurement at 5.7m away from Advanced starter (towards JHS side) and then proceeded towards Kms. 1256/1. After completing the measurements and recording the same (in three copies), he got it signed by OWS & DCWI (witnesses at paras 5.8 above) but the PWI refused to sign and the unsigned papers were handed over to DSO/JHS. While scrutinising the measurements made, he was asked as to why he started further away from point of drop, he replied that the team saw a no. of sleepers opened out and hence started from the point at which opening of sleepers and missing of keys started.

5.17. *Shri Faroog Ahmed* : Chief Controller/JHS gave a brief summary of the relief arrangements made by him on hearing the news of the accident. He was asked as to why ARME took 44' to leave JHS stn. He informed that there was no diesel power readily available in the yard and the delay was due to power getting out of diesel shed.

COMMERCIAL OFFICIALS

5.18. *S/Shri Sohan Singh*, Conductor and *S. N. Sharma & N. C. Gupta*, TTEs had given statements of the help and assistance rendered by them during post-accident operations. Shri Sohan Singh stated that all of them were available at site till evening hrs. till the arrival of divisional officers from JHS and left the site only on taking permission from Sr. Divisional Commercial Manager/JHS.

ENGINEERING OFFICIALS

5.19. *Shri Babulal Mulloo* : Gangman of G. No. 24 was working as keyman on 17-05-94 since the regular keyman was on weekly rest. He started from his gang tool box and went towards km. 1259, the end of gang jurisdiction, towards CNB end. On return when he was at km. 1256/4-5, 1034 Up passed and after a few minutes he heard a loud sound and saw the train derailing. He then rushed to stn. to inform SM/Ata.

He stated that when he was at km. 1256/4-5, he saw his gang at km. 1256/0-1, attending to instructions given to the gang earlier. After accident, he met the gang at 1256/2 and more gangmen [brought from adjacent stn. by the Divisional Engineer (East)]. He took part in helping the passengers, but on seeing the injured and dead persons he fell sick and took rest under a tree. After some time he came back and served water to the passengers. When asked about the condition of missing keys in his section he placed the figure around 2500.

5.20 *Shri Kalicharan Dishain* : Gangman of G. No. 24 stated that his gang was doing fly packing/joint picking at km. 1256/0-1 under instructions from gangmate Shri Pati. He stated that after opening out ballast, the gang attended squaring, gauging, levelling, lifting packing, boxing and dressing (all jobs finished), when 1034 Up passed the spot and derailed.

He stated that gang reported at site 07.00 AM and were at site for 4 hours till 11.00 hrs. He stated that the gang had opened out most of the wooden sleepers as well as few CST-9 sleepers and did all the work stated above. He stated that all fittings were in position before packing and boxing the ballast till the arrival of 1034 Up. He also stated that no alignment correction was done since it was only gauging and packing. After the accident, the gang ran away to a site away from public notice for fear of being manhandled by the public and came back only when the public left the site.

5.21 *Shri Dhaniram Ringa* : Gangman of G. No. 24. repeated more or less the same what witness at para 5.20 above stated. He stated that he was asked to pack up 6 nos. of CST-9 sleepers where there was a joint. He stated that they finished squaring, gauging, levelling, lifting and packing.

After the accident, at about 11.30 to 11.45 hrs PWI Shri Shrivastava came to site and asked the gang to attend to track immediately. *He admitted that as per PWI's instructions, the gang inserted key and coppers wherever deficient.*

5.22 *Shri Ram Senehi* : Gangman of G. No. 24 stated that p. way gang reported for work at site at 07.00 A. M. Initially he was busy in bringing water from outside for the gang and later took part in attending to joints in the wooden sleeper portion. He also admitted that at the accident site when the passengers had left, as per instructions of PWI Shri M. C. Shrivastava (witness at Para 5.28 below) the gang was put on rectifying the track affected by the accident.

5.23 *Shri Ram Sumer Rampal* : Gangman of G. No. 24 stated that on reporting for work the mate took them to km. 1256/0-1. As per instructions given by his mate he opened about 6 wooden sleepers, earmarked by the mate and opened ballast upto sleeper bottom, did gauging, levelling etc. except aligning. He stated to have boxed the ballast on one side when the 1034 up train passed the work spot. After two coaches of the train passed the work spot there was a loud noise and the coaches derailed. He immediately ran away towards 'A' cabin while other gangmen ran away in other directions. He came to the cabin and met Tejram/Cabinman (see para 5.13 above), and told him "train girgaye, hum mar gaye, humare bachhe bhukay mar jayeng". He also told the cabinman that the work they were doing should have been done under caution order. He also admitted that under instructions of Shri M. C. Shrivastava, PWI/Orai who came to the site later, the gang started attending to track from 13.00 hrs.

5.24 Shri Dukhi Jethoo : Gangman of G. No. 24 also admitted that the track had been opened out removing the ballast upto bottom of sleeper. After squaring and gauging by the mate, they started lifting, levelling and packing of sleepers. No alignment correction of track was done. When the 1034 Up train passed the work spot by about $1\frac{1}{2}$ rail lengths, the train became shaky and unbalanced and a heavy sound was heard leading to derailment. He stated that several passengers had come out of the coaches and started abusing them alleging that they had derailed the train. To escape their wrath, the gangmen ran away and hid under a tree nearby. After sometime, many villagers came and he and his colleagues joined the public and gave a helping hand to the aggrieved passengers. After sometime, he stated that PWI AEN, & DEN came to the site and started their work as per instructions given by PWI.

5.25 Shri Pati S/o Shri Mathura : Gangmate of G. No. 24 stated that on 17-05-94 his gang with 5 gangmen (witness at paras 5.20 to 5.24) were attending to joints. He said his gang had opened up 11 sleeper spacings and upto the bottom core of sleepers but boxing was done before passage of 1034 Up. The rail temperature was 45°C and joints were having expansion gaps.

He was asked to explain as to why against the sanctioned strength of $1+1+13$ gangmen, there were only 5 gangmen on the day of the accident. He said that there were 2 vacancies in the gang and one gangman was on night duty, the keyman was on weekly rest and others were on leave, sickness, absent etc. Normally on any day the gang strength is not more than 7 but at times it is just 4 only. He stated that on 17-05-94 he was allotted the above work by Shri R.K. Shrivastava, p. way Mistry (witness at para 5.26 below) who passed on a message for attending to joints at km. 1256/0-1. The mate stated that the above message which had been kept in his pocket was somehow lost. He reached with his gang at 07.30 hrs. He stated that wooden sleepers were opened for 2 rail lengths where wooden sleepers are provided and also on CST-9 sleepers. He said that he marked the sleepers wherever attention is needed and only on those sleepers ballast was opened out. Out of 5 people, 1 was sent for bringing water and with the rest 4 men opened out 30 sleeper spaces. When asked as to why he did not give any caution order for the work, he submitted that the work was of a routine nature, not needing a caution order. When asked about the condition of track fittings he replied vaguely that wherever the track was attended to the fittings were made good. He stated that at the time of passage of 1034 Up the gang was boxing the ballast. After the mishap, when the public came and started abusing the gangmen, he stated that he did not run away and stood at site only. He also stated that SM/Ata or other pointsman (see paras 5.12 to 5.14 above) did not come to site. After the PWI came to site, he stated that the gang was busy in unloading sleepers needed for restoration work from 17.00 hrs. From 12 to 17 hrs, he stated that the gang was clearing the site of the broken p. way materials. He said there was no rail closure at site and the rail temperature was normal as per the summer conditions

5.26 Shri R.K. Shrivastava : P. way Mistry, Orai stated that on 16-05-94, he had done rail renewal at km. 1253/7-8 and while returning with his dip lorry, saw run down joints at km. 1256/0-1. He found the joint at CNB end rather low and from a distance appeared quite slack. He saw play between the ends of rails. Hence, on 17-05-94 he was proceeding by 1505 Dn passenger train to Kalpi for attending to p. way repairs on Yamuna bridge and on the way he wrote on a piece of paper and threw it to gangmate of G. No. 24 for attending to the joint at km. 1256/0. He later went to Kalpi and on hearing about the accident came to site by a truck and took part in restoration measures.

Answering questions, he gave details of his past 19 yrs of service and stated that he became p. way mistry in June 92 and is working at Orai under PWI/Orai. He also produced a competency certificate issued by Sr. DEN/JHS on 18-05-93. He has five gangs under his control (gang nos. 25 to 29). G. No. 24 is not under his control. [It was clarified that p. way gang no. 24 works under the control of PWI/sectional (at para 5.27 below)]. He then gave details of rail renewal done by him on 16-05-94 at km. 1253/7-8 of one isolated defective rail.

He stated that he did not give a caution order for this work but checked up the movement of trains on field telephone and took adequate protection before changing the rail. He was asked whether he was aware that there are instructions that such rail renewal has to be done under traffic block only, he answer 'yes'. He did the above work by 17.00 hrs and while dip loring back, saw the rundown joint at km. 1256/0-1 at 18.00 hrs. He saw joints on wooden sleepers rundown (just ahead of Advanced starter at Ata). He also checked up whether the wooden sleepers had any missing fittings and stated that all fittings were intact. Next day viz. on 17th as stated by him in the previous para, he wrote down the spot location and passed on the message through a piece of paper to the mate while going on the train (paper was tied with a stone and thrown at the point where the gang had collected for starting the day's work). He did not give any verbal instructions to the mate while going on the train. (As stated by the mate in para 5.25 above, the above piece of paper had been lost). The p. way mistry clarified that joint gap was 4 to 5 mm and the condition of track did not warrant a speed restriction. He also clarified that only one joint is to be attended opposite to the Advanced starter/Ata.

5.27 *Shri N.R. Gautam*, P. way Inspector (Sectional)/ Kalpi stated that on 17-05-94 he was going to Orai by 1532 Up in connection with removal of encroachments. On the train he also met AEN/CNB. At Orai, there were gangmen of gang Nos. 18 to 22 and 29 (six gangs in all). There were also police officials who had come to site. When they were making preparation for the above job, they got information about the mishap to 1034 Up at Ata and immediately came down by a truck with all gangmen and tools and reached site by 11.45 hrs.

He had been working since March 93 as sectional PWI having 14 gangs under him from km. 1216 to 1290. He was asked to indicate his schedules of inspections which he did and he also stated that he had no problem in adhering to those schedules. He submitted that he checked the work of p. way gang no. 24 on 12-05-94, when they were working at km. 1256/6-7. The gang was picking up slacks in view of the track recording car (TRC) run being planned on the section. He also produced the register in proof of it. With regard to inferior CTR values obtained on this section, he stated that this was because of the track being laid in '57-'58 and overdue track renewal. Asked about rail fractures in the length of gang no. 24, he stated that there were fractures on 06-07-93 (km. 1254/2-3), 05-02-93 (km. 1253/1-2) and another at km. 1254/5-4 (un-reported). With reference to casual renewal of rail on 16-05-94 at km. 1253, he stated that the rail was quite old. As regards creep, his register showed "nil" creep on 1254-1260 (6 kms) from 1985 onwards. His explanation was that since the section was single line, traffic was balanced and hence this was "zero". He also stated that there are no "thefts" of track fittings in the section and on the gang beat of no. 24 there was only 1 case of theft in the last 6 months. The last ultra-sonic flaw detection testing (USFD) was done 2 months earlier and Kalpi-Orai section is not a fracture prone area. There was also no bad formation area in the beat length of gang no. 24.

As regards gap survey of rail gaps in short welded rails, he is duty bound to do this once in 6 months. He had done the gap survey of km. 1253-1254 (gang beat leant of gang no. 24) on 21-03-94. There were 2 SWR zones on either side of accident spot viz. Km. 1255/4-5 to km. 1255/9-10 and km. 1256/3 to 1257/3. From km. 1256/0 to 1256/3 there are turnouts and block insulation joints and as such SWR is discontinuous on this stretch of km. 1256/0-3.

On 21-03-94, the gaps on 1255/4—1255/9-0 were measured at a rail temperature of 40 to 41° (16.40 to 16.50 hrs) and average gap was 3.9mm against a theoretical requirement of 3.0mm. As per para 510 of IRPWM 86, this works out to case III, viz average gap as well as individual gaps are within the prescribed range and no adjustments are required. At km. 1256/3 to 1257/3 which was surveyed on 24-03-94, the average gap works out to 3.5 mm. It has been shown as case-II, which calls for adjustment of the entire panel gaps on this stretch. Shri Gautam admitted that even though the panel needed adjustment on the entire stretch, the same had not been done. Asked as to what will happen to track at km. 1256/0-3 which

has 1 side SWR on 1255/4-1256/0 needing no adjustment and other side on 1256/3-1257/3 needing total adjustments he said the intermittent portion has turnouts and free rails and hence there could be no apprehension that the gaps would close. He was shown the relevant provisions in "short welded rail" (SWR) manual (part of IRPWM 86) wherein it was stipulated that gap survey and subsequent rectification should be completed in Feb. of each year, whereas his section was surveyed for gaps only in March 94, he could *not* give a satisfactory reply. Further, it was obvious that the gap survey seems to have been done *just* to fill up register and no follow up action was taken. He was also asked as to how the entire section under him from km. 1216-1290 (viz 74 kms) was gap surveyed in just five days in March, he stated that it was possible.

He was asked whether he was aware as to what his p. way gang no. 24 was doing at km. 1256/0-1, to which he replied 'no', stating that the work was given by the p. way mistry (vide para 5.26 above) and not by him. He however justified that as per para 2.04 of IRPWM 86, such a type of work is permissible prior to onset of monsoon (which breaks out in June in that region).

5.28 *Shri M.C. Shrivastava, P. way Inspector/Orai* is the PWI (incharge) of the section from km. 1216 to 1290 (74 kms) which has 14 p. way gangs including km. 1253/1259 (gang no. 24 beat). He submitted that on 17-05-94 he was at Orai, where certain eviction of encroachments near station area had been planned for which several gangmen of gang nos. 16, 19, 21 and 29 had been detailed. While carrying out the eviction proceedings, at about 11.25 hrs, he was informed about the mishap and went along with his officers viz. DEN(East)/JHS & AEB/CNB (who were also at Orai) and reached the site by 11.45 hrs. After initially enganging himself with post accident relief work viz. helping passenger, he later took a survey of the damaged track. During his survey he found a buffer of coach no. CR 8420 missing from JHS end of the coach. He saw the buffer fixing arrangement of this bogie and found one bolt was missing, two bolts were without nuts and one bolt had freshly broken and missing buffer was lying at 110m from Advanced starter (towards JHS end).

Answering questions, he stated that he had put in 21 yrs of service, he worked in JHS-CNB section in various capacities and became PWI/Orai w.e.f. Feb. 93. He had been sectional PWI of the same section from 1980 onwards and hence he is more or less incharge of the section km. 1216-1290 for the last 14 yrs.

He had last inspected the gang beat of gang no. 24 on 09-05-94 when he travelled the section from Orai to Ata. He stated that the gang attendance was 1+1+4 and they were picking up slacks at km. 1254/5-6. He explained the reasons behind the seven men not available on that day (viz leave, duty elsewhere, night duty and long absentee etc.) He had also done foot-plate inspectoin on 12-05-94 by 9165 with WDM/2 no. 17729 and found only on spot riding bad at km. 1253/3 in the gang beat of gang no. 24 and the rest of track was OK. He had also checked up his diary and stated from Jan. 94 onwards, there has been no adverse riding spots on this gang beat. He was asked as to why creep was "nil" on the gang beat for nearly 9 yrs (viz from 1985 till date), he stated that normally creep above 1 cm only is recorded and since creep is less than 1 cm the same has not been recorded. He had measured the SWR gaps last on 02-03-92 (more than 2 yrs back) at km. 1254-1256/0. He did not measure 1256/3-1257/3 since this was not in last year's register. Asked to explain this, he stated it may be having isolated free rails and hence not measured since it is not fully SWR (this statement is discussed further) in para 7.3.7.6 below). He was shown details of 30 SWR joints in the above stretch, as mentioned in gap survey register of 1994 and asked as to what exactly he meant by free rail in the above stretch. He could *not* reply satisfactorily. He also could *not* explain as to why the gap survey and rectification was not finished before February as stipulated in the IRPWM '86.

Asked about the buffer of CR 8420 which had fallen down, he was asked whether he made an attempt to find out the missing bolts and nuts. He stated he tried, but could not find them. He was asked whether he gave instructions to the gang for rectifying the defects in the affected track for which he replied in the negative. He was asked as to why he refused to sign the joint measurements along with other senior supervisors. Here replied that in his presence only track geometry was measured which he signed but other observations were taken in his absence. [At this stage the others of members of the team viz. CWS, ALF and TI (witnesses at paras 5.8 & 5.16 above) were called who stated that all measurements were taken in PWI's presence only but PWI was not agreeable to the recording of the *obvious* deficiencies. They stated that PWI took the statements to the DEN and AEN and after discussing with them he simply returned the papers unsigned. (However, PWI/Orai stated that he did not show the papers to AEN or DEN but another PWI and after consulting him, returned the papers). Shri M.C. Shrivastava however produced another sheet of paper recording his own observations unsigned by the other supervisors.

5.29 *Shri M.p. Sood*, Asst. Engineer, C. Rly/CNB in his statement informed that he came to Orai in the morning of 17-05-94 in connection with removal of encroachments. He was also to push trolley the section from Orai to Ata along with his DEN(East)/JHS. However at 11.20 hrs he got a message about the mishap and left for site in a jeep with his DEN leaving behind instructions to his PWI to follow in a truck with labour and materials. On reaching site, he got involved in rendering help and assistance to the various passengers till 13.15 hrs. He left instructions to his PWI to take measurements and preserve clues relevant to the accident. He was apprised as to the condition of the broken pieces of rail (left rail at km. 1256/0 to 1255/10) and asked to explain how the rails have taken such shape including a rail which pierced through two coaches. He was also told to explain how the broken rails did not have fish plates and bolts and in one or two cases, fish plates were available but bolts and nuts were missing. He replied that all this phenomena clearly indicate that the left rail became *completely free*. He said that this is possible only if fish plates are missing or rail could have fractured inside the joint making the rail to freely lift. He admitted that fish plates cannot be missing (since the gang was working at site and hence the possibility of sabotage rules out). He also stated that there was *no* rail fracture at this fish plated joint. Hence, the only possibility as per him was that p. way gang working at site might have *removed* the fish plates while attending to joints. As regards fish plated joints, he was asked whether the fish bolts sheared off making the rail ends free he stated that it is a possibility but at site he did not look for sheared bolts to examine the above aspect. He was asked to give his comments on the fallen buffer of CR 8420 which was seen by him at km. 1255/14. He stated tha he examined the buffer and found *no* wheel marks. He admitted that the buffer after falling from the coach could have fallen away from track and could not have come in the path of the following wheels of the coach. Hence he ruled out the possibility of buffer forming an obstruction to the path of the train thereby causing the derailment. He also got the information that the speedometer chart indicated 98 kmph at the time of derailment (vide Annexure-IV, the Calibrated speed is 91.2 kmph). Since the sectional speed was 100 kmph he admitted that there was no overs peeding.

He was informed that the gang was supposed to pick up a random joint in which case there was no need for any removal of fish plate. He was also shown the gap survey register wherein the location had been measured by sectional PWI on 21-03-14 (vide para 5.27 above) and gap survey made it uuder "category III" needing no adjustment of gaps. Shri Sood admitted that even for adjustment of gaps, fish plates are not taken out and only bolts are loosened and gaps adjusted. He also did not find any trace of gang doing oiling/greasing of joints (normally such jobs are done in January). As regards jammed joint, based on his past inspection notes, he did not find any jammed joints and also creep register shows "nil" creep. He also admitted that the above section of gang is free of rail fractures. As regards missing fittings he stated that the above gang length is not having serious problem of missing/fallen fittings. He had inspected the section by push trolley on 23-03-94, motor trolley on 01-04-94 and engine inspection on 12-04-94. He gave details of his inspection notes including the performance of mate

of gang no.24 (witness at para 5.25 above) who was not found at site during his inspection. He however did not find any bad spot at km. 1256/0-1 during any of his inspections.

5.30 *Shri A.K. Dadariya*, DEN (East), C. Rly, Jhansi stated that on 17-05-94, he had reached Orai at 11.20 hrs for proposed eviction of encroachments and on eaching site he was informed of the accident to 1034 Up at Ata the next station. He took AEN/CNB, PWIs, IOW on his jeep with a truck following with gangmen. After he reached the site at 11.45 hrs, he immediately talked to Ayodhya Prasad, driver of 1034 Up (witness at para 5.2 above), but the later could not inform him as to what caused the accident. After the truck reached the site, he organised the assistance to passengers with his labour, carrying their luggage to the road 50m away from track on which a no. of road vehicles had been stopped by civil & police officials and the affected passengers were taken either to Orai or Kalpi. DM. & SSP of Jalon district reached the site at about 12.15 hrs with about 100 PAC jawans. Shri S P Khare, Dy Director, RDSO/LKO (witness at para 5.32 below) also met him and thereafter he was involved in post accident relief measure still the passengers were cleared from the site by 13.30 hrs. The portable communication at site was set up at 13.35 hrs which enabled communication with all concerned. He also took observation of the wreckage and noted the fallen buffer of CR 8420. Afterwards he took instructions from ADRM/JHS who reached the site at 14.20 hrs.

Answering questions, he stated that he has been DEN of the section from Oct. 93 onwards. He is normally supposed to do push trolley/motor trolley inspection once in 6 months and foot plate inspection once in 2 months. However, he has not inspected the section by trolley even once during the last 7-1/2 month of his assuming charge, though he has done last vehicle inspection on 12-05-94. He gave details of the TRC recording in May 94 and oscillation record by OMS-2000 in March 94. He has not checked the work of gang no.24 but however during his last vehicle inspection on 12-05-94, he found certain bad riding spots in the jurisdiction of gang no. 24, but there was no defect at km. 1256/1255. He was asked whether he talked to the gang mate Pati (witness at para 5.25 above) as to what his gang was doing at km. 1256/0-1 on that day the latter informed him that they were doing joint packing. The mate at that time could not inform as to who had booked them to work at site he did not inform that there was a message by p.way mistry R.K. Shrivastava, witness at para 5.26 above).

In his assessment, he was of the view that rear trolley of engine or the 2nd coach CR 8420 could have been the culprit vehicle towards the cause of the accident. He was more suspicious of the engine, seeing the consequences of the accident. He also gave his theory explaining the setting of unbalanced forces that had taken the coaches away from the track. He was asked to explain how the left rail became totally free, with all fish-plated ends having no plates/bolts. He again started explaining that the unbalanced movement caused the left rail joints being hit shearing ov the fish bolts, making the rail ends free. He was informed that rear trolley of engine derailed towards the right (while the front trolley was on rails) and asked as to why right hand fish plated joints were not having hit marks. He *could not* explain this. Regarding the buffer of CR 8420, he found two hit marks, but he could not say with certainty that they were caused by wheels of coaches passing over it. As regards gang work, when he saw the site at about 14.30 hrs, there were 11 sleepers where the ballast had been opened out and one joint had ballast marks on the unaffected track, but was not sure on the affected track, as to what exactly the gang had done. He also stated that there was no rail fracture nor is there a possibility of sabotage.

RDSO OFFICIALS

5.31 *Shri D.K. Gupta*, Director (TI)/RDSO/LKO was travelling by AC 2-Tier of 1034 Up with his family (wife and son only). After the mishap, he got down and after surveying the wreckage at site as well as the coach where a rail piece had gone through, he went to Ata station and informed JHS control to arrange breakdown train. He also saw engg gang nearby and instructed them to attend to passengers. Since JHS divisional officers had arrived at site by 12.30 hrs and civil officers were available, he left site by about 13.00 hrs, since his son who was due to appear for exams at Bombay was feeling ill and had to be looked after.

5.32 *Shri S.P. Khare*, Dy. Director/RDSO/LKO had travelled by 1st class of 1034 UP. After the derailment, he felt uneasy being a BP patient himself and took some time before he came out of his coach and stood at site till AEN/CNB and DEN (East)/JHS (witnesses at paras 5.29 & 5.30 above) came to site. He also took part in rendering assistance to passengers and remained at site till 13.15 hrs and later left towards LKO.

He was asked specifically as to what could have happened to cause the above derailment since he is a track specialist of RDSO, he could not throw any light since the cause was not obviously visible or discernible.

JHS DIVISIONAL AUTHORITIES

5.33 *Shri R.K. Rao*, Additional Divisional Railway Manager, JHS was available in JHS control office when message came regarding the above mishap. After making the relief train arrangements, he left by medical van along with divisional officers and reached the site by 14.20 hrs. At site, he did not find any passengers except one Shri Dassapa (father of one deceased boy by name Amarnath). He also saw the dead body of another lady in the same coach no. 9118. Dead bodies were amputated by doctors since they were entangled with the broken rail (which pierced through the coach no. 9118 from the floor) and taken to Orai in the medical van. Thereafter he gave various instructions to his officers for relief arrangements. P&T authorities installed an STD telephone at site by 15.30 hrs.

The accident site was seen by him and no obvious cause could be ascertained immediately. However, the point of drop was clearly seen though no inference could be drawn. In the meantime, as per CRS's instructions given from the GM's spl train enroute from BB VT to site, he nominated Sr. DEN(C)/JHS to constitute a JA grade officers group to take joint measurements. He also arranged for still photos and video films to cover the accident site.

5.34 *Shri V.K. Agarwal*, Divisional Rly Manager, Central Rly, Jhansi got the message at 11.12 hrs from JHS control and after making necessary arrangements left by breakdown train at 12.30 hrs (his ARDM had left earlier, as per para 5.33 above) which reached Orai at 14.55 hrs and looked after relief arrangements. He thereafter went to district hospital Orai to call upon injured passengers admitted there. Afterwards he went to site and supervised the restoration activities. He was of the opinion, after seeing the site that prima facie cause of accident was due to opening out of rail at fish plated joints. He was of the view that on the day of accident, 1034 Up was behind schedule by nearly 11 hrs and the gang being unaware of this took a chance to open out the fish plated joints for gap adjustments. He corroborated his view by the post accident phenomena of twisted/broken rails which indicated joints free of fish plates, which made the rails get twisted into 'S' form with a piece of rail going further into the coaches. He also further supported this theory that the coaches had gone away from track by nearly 20 mts, which is possible only if the rails are made open from the fish plated joints. The absence of any mark of mount, but only wheel drop marks confirm this further. As regards the fallen buffer of CR 8420, he examined it carefully but found no mark of mount on the buffer and hence ruled out the possibility of buffer forming an obstruction to the passage of the train.

VI. OBSERVATIONS AND TESTS

6.1 As mentioned in para 1.2.1 above, when I left Bombay by GM's spl, I had left instructions that all the accident damages must be preserved and no restoration work should start till I reach the site of accident. When the spl. was on its run I had received a message enroute that restoration work had been held up in view of the above stipulation. I had then left a message at KYN and later repeated the same at Igatpuri and Bhusaval that a team of three JA grade officers should jointly take site measurements and produce enough documentation to enable the undersigned to reconstruct the full picture of accident damages.

However, when I reached the site at 09.30 hrs on 18-05-94 (after nearly 22 hrs of accident), the restoration was in last stages, but the joint observations made were incomplete viz. the track measurements were done in "floating" condition and not in "loaded" condition. I then instructed the above team to take up fresh readings under load (fortunately the track in rear of point of drop remained fairly undisturbed). This was done by the team and the readings are given in Annexure-III. Subsequent to my message, the division had also organised a video film covering the various aspects of the accident affected spot. This film as well as the still photos taken proved to be quite helpful in progressing with my investigations.

6.2 A noteworthy feature of this accident was that after the first coach from engine, from second coach onwards till the 12th coach, the whole train had moved laterally in the shape of a "bowstring". One of the coaches CR 91307, placed 6th from engine went as far as 18 mts from the existing track alignment. What was rather unique about the displaced coaches was that the coupling and train piping were practically intact in all the coaches affected.

The right rail more or less remained continuous but kinky at places (vide photo 'B' at Annexure-II/C), while the left rail broke into several pieces. One of the broken rails had taken a 'S' shape (vide photos at Annexure-II/A), while one piece had gone through the floor of coach no. 9118 and came through the roof of the next coach no. 91307 (see photo 'B' at Annexure-II/B). Another broken piece of rail with a weld joint broken was lying on the right hand side of track (vide Annexure-I/C).

6.3 The details of the damages to rolling stock have been mentioned in Chapter-III. The rear trolley of WDM/2 engine no. 17828 had been derailed in the accident. The above loco after rerailment was brought to Jhansi diesel loco shed and underframes run out after lifting the body in the pit line. The underframes were examined in detail and the observation recorded jointly by the above team of officers and the same are presented in Annexure-V. Coach no. 92108 SLR (next to engine) was also brought to the diesel loco shed, on rerailment and under-gear measurements made by the above team, which are detailed in Annexure-VI.

All the other coaches which had been derailed and thrown out of alignment quite away from track had suffered considerable damages and it was felt that no useful purpose would be served by taking observation of the under gear/suspended components, since the same would only give misleading conclusions. As such it was decided that for the first 6 coaches viz. 92108, 8420, 92394, 92378, 9118 and 91307, the last neutral train examiner's records (after the last POH) were obtained from Matunga Carriage Workshops, C. Rly where they had undergone POH. The results of the neutral TXR have been tabulated itemwise and presented at Annexure VII.

6.4 A window trailing inspection was done by the GM's spl from JHS to Orai, while going to site. Subsequent to the conclusion of the inquiry it was felt necessary that certain aspects of track maintenance on the above section need to be studied in detail. Accordingly, the section from JHS to Kalpi was inspected by a spl train along with Additional Divisional Railway Manager/C Rly/JHS and DEN (East)/JHS. Further, the section Orai to Kalpi was trolleyed along with P way officials and the following observations are recorded :

6.4.1 The above section viz. JHS to Kalpi has been laid with 90R CST-9 sleepers on (M+4) density in '57-'58 except for a patch of 16 kms on Ait-Konch section which had been relaid with MBC sleepers and 52 kg rails. Certain patches have also been programmed for "through rail renewal" (TRR) and 52 kg rails have been received partly. However, the section from Ait to Kalpi (km. 1216 to 1275) on which the above derailment took place has not been programmed for renewal.

6.4.2 The section in general had adequate ballast and it was heartening to see less ballast collected at several places due for training out. Certain sections are rail fracture prone, while the condition of rails in other sections is generally satisfactory. However, in CST-9 sleepers, while the position of coppers is good, what is alarming and causing

concern is the large % of missing keys on the short welded rails. A few sample checks done on Orai-Ata section at isolated locations are given below :

Sl. No.	Location of SWR	No. of sleepers in SWR	No. of keys missing	% of keys missing	Remarks (worst location of missing keys)
1.	1242/6-7	44	39	44%	4 keys continuously missing on LH rail at one location.
2.	1243/5-6	44	32	37%	3 keys continuously missing on RH rail at one location.
3.	1245/0-1	47	34	36%	7 keys continuously missing on LH rail at one location.
4.	1250/0-1	46	41	45%	6 keys missing continuously in right rail.
5.	1257/7-8	45	28	32%	4 keys missing continuously in left rail.

On the accident affected section km. 1256/0-1 to 1255/9, Annexure-II brings out the % of missing keys. This is discussed further in para 7.3.7.3 below.

The PWI Orai who had accompanied the above trolley inspection was questioned about the above phenomena for which he answered that keys are dropping out due to heavy wear in rail seat in CST-9 plates, but he could not show any record of having systematically measured the wear on rail seat. In fact, vide para 5.2.8 above, he had stated during inquiry that there was no problem of wear at all in rail seat of CST-9 plates. At no place I saw any moonliner on saddle plate on CST-9 sleepers being used to prevent falling of keys.

6.4.3 The creep register was checked and the stretch under PWI/Orai more or less indicates "NIL" creep for the last 9 yrs w.e.f. 1985. When the DEN (East)/JHS was questioned on this, he answered stating that being a single line and traffic in both directions was more or less equal and hence there was no creep at all. However, at practically every k.m. no creep indicator posts were available. In one location where creep indicator is available, reference marks on rails were not available. When the DEN & PWI were questioned on how to measure the creep in the absence of creep indicator posts, there was NO ANSWER!!.

6.4.4 Gap survey register for SWR was scrutinised in the field to observe the state of affairs in the field. At km. 1256 to 1257, the SWR panel on the entire km. was missing in the register of entries till Dec. 93. There is only one entry in March 94 in a newly opened register (probably the register must have been filled up for the accident inquiry !!). SWR panels were in existence at km. 1256-1257 for the last decade or more and no gap survey of joints has been done at all !! When PWI was questioned on this, there was NO ANSWER!! It is also worth mention that the gap survey registers have not been scrutinised by any divisional officers of JHS division nor by any territorial HOD from C. Rly HQ.

6.4.5 During trolleying, I found a no. of stretches, jammed points for five or six consecutive joints. Even at km. 1256 to 1257 (Ata yard), I could count upto 4 consecutive joints jammed at about 12 hrs on 21-05-94 (when rail temperature could perhaps be around 50° C).

VII. DISCUSSION

7.1 Time of the accident

As per the driving crew of 1034 Up, the train had passed Ata at 11.10 hrs and within a minute, the accident had taken place. The same was repeated by the guard as well. As per the timings given by SM/Ata, the cabinman 'A' cabin informed him about the mishap at 11/09 hrs. which could place the accident between 11.08 to 11.09 hrs. The section control had recorded the message at 11.10 hrs., on being informed by SM/Ata. Vide Annexure-IV, where the speedometer chart has been calibrated, the train speed became zero at 11.08 hrs. Taking all the factors into account, the time of accident has been determined at 11.08 hrs.

7.2 Speed of train

The driver of the train, vide para 5.2 above, estimated the train speed at 75 kmph. Shri S.N. Bajpai, Asst. Loco Foreman/Diesel shed/JHS who was travelling in the foot-plate of the engine (vide para 5.5 above) also stated that the speed was around 80 kmph. However, he also stated that there has been some difference between the electrical and mechanical speedometers. However, the VDO speed recorder was later taken to JHS diesel shed and calibrated properly. Report given by the diesel shed/JHS is at Annexure-IV. As per this, speed just prior to derailment was around 91.19 kmph, say 91 kmph. This is taken as the speed of the train.

7.3 Contributory factors relevant to the cause of the accident

A mid section derailment could occur due to a variety of reasons, some of the more important of which are the following :

- (i) Convulsion of nature
- (ii) Sabotage
- (iii) Overspeeding/sudden braking on a down gradient
- (iv) Obstruction on track
- (v) Defects in locomotive
- (vi) Defects in coaching stock
- (vii) Defects in permanent way



These are discussed in the following paragraphs :

7.3.1 Convulsion of nature

This results in settlement of track due to rain, washaways, etc. The weather at the time of accident was clear, being a hot summer day (with sweltering heat) and there was no record of any rain or flood just prior to the accident. Hence there has been no convulsion of nature.

7.3.2 Sabotage

A permanent way gang had been working at site at the time of passage of the ill-fated train. The driver of the last train which passed through the section (vide para 5.4 above) stated that he did not feel any lurch at the spot of derailment when his train passed through at 08.26 hrs. As such possibility of sabotage could be ruled out.

7.3.3 Overspeeding/sudden braking on a down grade

The VDO speedometer chart which was taken out of the loco and got calibrated at JHS diesel shed (vide Annexure-IV) had indicated a speed of 91.19 kmph. This is less than 100 kmph, the maximum permissible speed of trains on JHS-CNB section. At km. 1256/1255 there is no restriction (either permanent or temporary) and hence there has been no overspeeding by the train crew.

As regards grades, the following grades are available from km. 1261 to 1255 [vide Annexure-I (b)] :

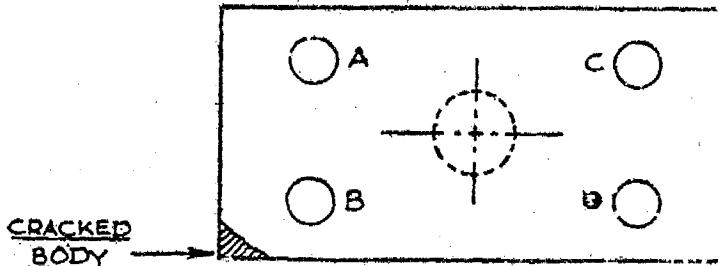
Km. 1261 to 1259.6	: 1 in 3000 falling
Km. 1259.6 to 1258.25	: level
Km. 1258.25 to 1257.7	: 1 in 200 falling
Km. 1257.7 to 1256.4	: level
Km. 1256.4 to 1255.4	: 1 in 1000 falling

The above gradients are indeed very flat and there could be no reason for sudden braking, except as the train crew and the asst. loco foreman, JHS diesel shed had stated, they felt a severe lurch at km. 1256/0 and had to apply emergency brakes, apprehending danger.

7.3.4 Obstruction on track

At the accident site, at km. 1255/14-15 a buffer was seen to have fallen down near the right hand rail (facing direction of traffic). The first person to observe this immediately after this accident was Shri S.N. Bajpai, ALF/JHS (witness at para 5.5 above) who found it about a foot away from the rail face. He did not notice any other buffer or fallen part near the track. He had observed the buffer, while walking over the accident spot within a few minutes of the mishap. He however admitted that he did not examine the buffer minutely for any wheel marks. Subsequently, the DEN/JHS & AEN/JHS (witness at paras 5.30 & 5.29 respectively) also saw the buffer on their arrival at site at 11.45 Hrs. As per the view of the former, the buffer, had two hit marks, but he was not sure that the same were due to wheel flanges. The AEN was however clear that the buffer did not have any wheel marks and he was also of the view that the buffer after falling from the coach would not have come across any of the wheels of the trailing coaches. As such he felt that the buffer would not have acted as an obstruction to the passage of the train. The DRM/JHS (vide para 5.34 above) had also seen the buffer at about 17.00 hrs. on 17-05-94 and noticed there was no mount mark on the buffer.

The above buffer was seen by the undersigned on 18-05-94 (during the final stage of restoration). The buffer was at the right hand leading end of the second coach from engine CR 8420. Two bolts of the buffer were found sheared off (A&B) in sketch below and other two bolts and nuts marked C&D were not available at site. Split pin of C was found available in the bolt hole. Buffer housing was found cracked near the 'B' bolt cover (see sketch below). The buffer had also left an impression on the JHS end panel of coach (the panel was found pressed).



On a close scrutiny of the buffer (vide photo at Annexure-II), it was noticed that there were certain marks on the rim of the plunger disk (buffer face) while main housing was free of any marks. Normally, if a buffer falls on the track and if a wheel passes over it, a wheel load of nearly 5.5 tonnes should definitely be able to leave distinct mark on the buffer. Even granting that the buffer bolts were deficient prior to accident (the bolts and nuts at C & D could not be traced at site easily though they might have been mixed up with a lot of debris collected at site), the fallen buffer in its position would not have formed an obstruction, since there was a clear distance of not less than 25 cms from the face of rail available which would make the passage of wheels free. As such an obstruction coming in the way of train wheels is ruled out.

7.3.5 Defects in locomotive

Joint observations of the locomotive are indicated at Annexure-V. Some of the salient features affecting the safety and riding stability of loco, and relevant to the accident are commented upon as under :

(a) Wheel diameter

All the wheelsets have indicated uniformly 1092 mm (which is the nominal gauge prescribed for this loco).

(b) Wheel gauge (measured at quarter points) mm :

	1	2	3	4	Average
wheel set 1	1596.0	1596.5	1596.85	1597.03	1596.595
wheel set 2	1596.05	1596.0	1595.3	1596.0	1595.83
wheel set 3	1596.5	1596.85	1596.6	1597	1596.70
wheel set 4	1596.55	1596.1	1596.55	1596.1	1596.32
wheel set 5	1596.0	1596.2	1596.99	1596.1	1596.32
wheel set 6	1595.75	1596.5	1597.85	1596.5	1596.65

Para 3.5.2.2 of RDSO's maintenance instruction manual no. MP-MI-71/78 lays down a limit of 1596 ± 0.5 mm, an average of 4 measurements at equal spacing on the periphery of wheel. The above limit of 1596 ± 0.5 has been exceeded at 1, 3 & 6 by 0.95mm, 0.20 mm and 0.15 mm respectively. These are considered marginally above the limit prescribed.

(c) Axle box lateral clearance (Total) :

Sl. No.	Wheel set	Total clearance (left & right)
1	1	0.639"
2	2 (middle)	1.111"
3	3	0.877"
4	4	0.591"
5	5 (middle)	1.079"
6	6	0.507"

As per para 3.5.2.3 of RDSO's manual MP MI-71/78, axle box liners are to be replaced when the following clearances between axle box and bogie pedestal are exceeded :

	As new	Service limit
Front and rear axle (total per axle)	6mm (0.25")	12mm (0.5")
Middle axle (total per axle)	25mm (1")	31mm (1.25")

As far as middle wheels 2 & 5 are concerned, the above service limits have been satisfied. However, in case of other wheelsets, the service limit of 0.5" had been exceeded in all cases (wheel set 6 has exceeded by marginally by 0.007").

On a careful examination of the underframe, the liners had dropped due to welding having given way (liners are normally welded to the frame). On a careful check of the records, the lines had been checked at shops on 24-04-94 during quarterly schedule and records indicate clearances to be within limits. Hence, the liners dropping is to be taken consequential to the accident, and caused the enlarged lateral axle box clearances as noticed above.

(d) Axle box longitudinal clearance

Location of axle box	Long. clearance	Location of axle box	Long. clearance
L1 Fore	0.104"	R1 Fore	0.105"
Aft	0.131"	Aft	0.051"
L2 Fore	0.157"	R2 Fore	0.098"
Aft	0.133"	Aft	0.06"
L3 Fore	0.135"	R3 Fore	0.082"
Aft	0.134"	Aft	0.075"
L4 Fore	0.128"	R4 Fore	0.2305"
Aft	0.121"	Aft	0.185"
L5 Fore	0.15"	R5 Fore	0.182"
Aft	0.163"	Aft	0.158"
L6 Fore	0.094"	R6 Fore	0.143"
Aft	0.153"	Aft	0.110"

All the above clearances are within 5mm (0.20") prescribed except at R4 (fore), which is isolated and can be ignored.

(e) Buffer height

The values are indicated below :

Engine front (right) 1030mm

Engine rear (right) 1025mm

Engine front (left) 1037mm

Engine rear (left) 1052mm

The allowable levels are 1105mm (max) & 1030 mm (min). As per these tolerances, the engine rear right buffer is less than the min. allowed. The loco was released after trip schedule on 14-5-94. The driver had not booked any defect in the buffer either while taking over charge at JHS or while on run. However, when the loco was examined at the site as well as later in the shed, it was noticed that some of the nuts of the buffers were missing and it was having a visible crack at the top leading to a droop, which made the buffer height less. Since the rear trolley of the loco had derailed towards the right, it is quite probable that the buffer must have been hit due to impact with the buffer of the rear coach leading to the inevitable droop.

(f) Side bearers

Two main observations were made:

- (i) On the front as well as rear bogies (on right side) a few of the bronze liners were found broken.
- (ii) In both bogies the oil was less.

As regards item (i), evidence at site clearly indicates that this was due to derailment since the loco had derailed on its right thereby causing extra pressure on right hand side bearers which had resulted in bronze liners getting broken. As regards item (ii), the oil was less, yet it was sufficient to lubricate the pins. The surface was not dry and was quite oily. Normally, the side bearers are covered with dust guards which is made of felt and packing. During motion of the loco, the oil is spilled and absorbed in the cover thereby making the oil level go down, which is topped up during monthly schedule. It was also seen at accident site that there was considerable spillage of oil from the engine when the rerailment work was done.

(g) Pivots—These were examined and no damage noticed.

Apart from these items there was no other item found defective/deficient during examination. Since there was no major factor/feature out of items (a) to (g) above, which could have a bearing on the cause of the accident, the loco is not held responsible.

7.3.6 Defects on coaching stock

7.3.6.1 SLR coach no. CR9 92108—first from engine (Body BEML, trolley ICF, RCF coach built at RCF, Kapurthala, 91). The coach had its front trolley derailed on the right and the rear left towards left. After rerailment the same was brought to JHS loco shed and observations recorded in the standard proforma. These are given in Annexure-VI. The main items relevant to accident are discussed below:

(a) Thickness of wheel flange (mm)

LR	LR	All dimensions are permissible
24	27	
LL	LL	
25	27.5	
TR	TR	
26	28	
TL	TL	
27	28	

(b) Wheel gauge (mm)

Bombay end trolley:

Leading: 1599.47, 1549.57, 1599.65, 1599.76=1599.61 (Avg.)

Trailing: 1599.10, 1599.30, 1598.75, 1598.75=1598.98 (Avg.)

Delhi end trolley

Leading: 1599.54, 1599.57, 1600.12, 1600.32=1599.85mm

Trailing: 1598.67, 1598.30, 1598.15, 1598.65=1598.67mm

Wheel gauge should be within 1600+2—1mm; both trailing ends of the trolleys have marginally less wheel gauge (.02mm and .33mm respectively).

(c) Wheel dia

Leading trolley: 850, 850] within 915—819mm

Trailing trolley: 847, 849] range permissible

(d) Buffer height

LR 1067mm TR 1072mm (within range of

LL 1062mm TL 1062mm 1105 to 1030mm)

(e) Condition of pivots: OK

(f) Condition of springs: OK

(g) Special observations : On the BB-end trailing left side flange, there was a heavy cut and the DLI end trailing right wheel flange, there was fresh cut mark size 90mm×70mm×8mm. It was felt that the fresh cut marks could be the result of wheel flange coming into contact with sharp edges of rail/fish plates during the process of derailment.

7.3.6.2 As mentioned in para 6.2 above, from the next five coaches 8420, 92394, 92378, 9118, 91307 (placed 2nd to 6th from engine), no site measurements could be undertaken in view of large scale damage to undergear. As such records of neutral TXR examination done in Matunga Sheds, C. Rly when the coaches were sent for their POH were obtained. They are presented in Annexure-VII. It can be generally seen that no discernible defect deficiency could be detected in any of the coach measurements done during the neutral TXR examination.

7.3.6.3 Records of the secondary maintenance conducted at NE Rly C&W depot LKO have also been gone through. The condition of cylinders, piston strokes, slack adjuster (Dimension 'A'), free lift between brake shaft arm and piston rod etc., were found OK in all the above coaches. There was no major repair done in the above five coaches. On coach no. 92378 (4th from engine), dash pot oiling which is done at Margao depot, C. Rly sheds was last done on 21-03-94. Normally, this should have been done next on 21-04-94. There was no entry in April 94 (stencil mark missing). But for this item, the above five coaches seem to have been attended to properly at NE Rly C&W depot/LKO in the early morning hours of 17-05-94 during secondary maintenance.

As may be seen from the above, except for the buffer of CR 8420 (which has already been dealt with in para 7.3.4 above), there has been no other defect/deficiency which could be pinpointed in the first 5 coaches of the train composition and hence the role of coach defect in this accident has been ruled out.

7.3.7 Defects in track

7.3.7.1 Freshly broken welded joint

As mentioned in para 6.2 above, the broken pieces of left hand rail had a freshly broken thermit welded joint [vide Annexure-I(c)]. The fractured surface of the broken weld was examined carefully. It was crystalline in nature, indicative of sudden failure due to impact received after the accident which was also further corroborative by certain scoring marks observed on rail table. Further, the location of the weld failure was quite far ahead from the point of drop of the wheel marks and hence the weld failure was treated as consequential to the accident and hence no detailed chemical and metallurgical examination was done on this weld failure. It is also worth mentioning the replies given by p. way officials viz. AEN/CNB (vide para 5.29 above), PWI/Kalpi (vide para 5.27 above) that the above sector Kalpi-Orai had generally few rail/weld failures in the past. Even the last USFD testing done about 2 months prior to the accident indicate the above stretch free of suspect rail/weld joints.

7.3.7.2 Track geometry measurements at site of accident

The distinctive feature of the accident (as it happens in almost every other case of derailment) is the absence of mounting mark. This could not be seen at site and also statements of eyewitnesses such as train crew as well as gongma at site indicate that the whole process of derailment has been rather sudden.

From the sketch of sleeper measurements (Annexure-III) it could be seen that the sleeper numbering has been started with '0' at a sleeper where right rail had rubbing marks on inside face of rail head. The first point of drop had been noticed on sleeper no. +5 and

+6, the latter more clearly. As such, readings had been taken from 'O' towards the rear since it was considered that the train had been affected from this point. Readings from 0 to -11 had been taken in "floating" condition and from -11 to -41 had been taken both at "floating" and "loaded" conditions. Recordings from 0 to -11 were not taken in "loaded" condition on 17-05-94 and on 18-05-94, by the time I had arrived at site, the above stretch had already been attended to and there was no use in taking reading on this "attended" stretch.

The gauge measurements are generally varying from exact to +5mm slack except at stn-1, where it is +20mm slack. The variations of gauge from sleepers -3, -2, -1, 0 are 0, +4, +20 and +5. This variation on a sleeper spacing of about 80 cms on this section works out to nearly 5mm/m, 20mm/m & 18mm/m on gauge variations which are excessively high and unacceptable for normal maintenance. As regards cross level variations, the variations on both "floating" & "loaded" conditions are acceptable and no excessive variation from sleeper to sleeper has been noticed.

7.3.7.3 Condition of fittings

Reference may be made to Annexure-III, where the condition of fittings in each sleeper viz. of spikes, keys (both for wooden as well as for CST-9 sleepers) has been indicated. Starting from "0" upto sleeper no. -47, the no. of keys missing and spike loose are given below :

Wooden sleepers (0 to -35)

Total no. of spikes	: 288 (4 nos/rail set)
No. of spikes loose	: 76 (27% loose)
Total no. of keys	: 72
No. of keys missing/loose	: 32 (45% keys missing/ loose) [in several sleepers continuously missing].

CST-9 sleepers (-36 to -47)

Total no. of keys	: 24
No. of keys missing/loose	: 8 (33% keys missing/loose)

As can be seen from the above, there is a very large % of keys missing/loose on the above stretch of 47 sleepers behind the "zero" point. The spikes are also loose to the extent of 27% on wooden sleepers. In fact on five sleepers just in rear of zero point, spikes were practically loose in all sleepers. This was also further substantiated by the fact that the sleepers had moved laterally, leaving tell tale marks on the shoulder ballast (which was shown to me on 18-05-94 and also photographed in still and video films).

7.3.7.4 How many no. of sleepers were opened out by p. way gang no. 24 ?

This has been a question put up to a no. of p. way officials who were at site within 30' of the accident. The statement of DEN puts it at 11 sleeper spacings only while the other's statements have not been clear on this aspect. It is also worthwhile to note that the gang consists of 1 mate and 5 gangmen at the site of work. As per statement of Shri R.K. Srivastava, p. way mistry (vide para 5.26 above) he had passed on the instruction to attend to the point by a written message which was thrown by him with a stone, while he was passing by a passenger train on the morning of 17-05-94. Granting that the message was thrown at g.r.g when they were at tool box which is at a distance of 1 km from the spot of work, the gangmate and his men would have in all probability commenced the work, sometime after they had reported for morning duty. It is also worthwhile recalling the statement of Shri Mewaram, driver of 1532 CNB-JHS passenger which passed the spot of accident at 08.26 hrs in the morning (vide para 5.4 above). He had stated that he did not see the gang working at the spot while passing by his train. As such any possibility by the gang arriving at site before 08.30 or even 09.00 hrs is ruled out. That leaves only two hours of work left for the gang before the mishap took place.

It is interesting to recall the statements of all the gangman as well as gangmate (vide paras 5.19 to 5.25 above). Almost all of them had stated that they had opened out 6 sleepers each allotted to them by mate, opened out the sleepers, carried out gauging, levelling and were in the final stages of boxing the ballast. Normally this type of work should take a full day's time for the gang (as per their normal through packing schedule). How could this be possible in just two hours' time !! It is well known to all p. way officials that nearly 40 % of a gang work on track is spent in opening out the sleepers or in other words, out of eight hours of schedule, not less than 3 hours would normally be spent on this aspect alone. As such in all probability the gang had just opened out sleepers prior to the passage of train, though as to what extent the information is sketchy. In fact the gang work had just started 5.7m ahead of Advanced starter at Ata (vide sketch at Annexure-III) and the statements of the gangmen and mate do give an indication that both types of sleepers viz CST-9 and wooden had been tackled and upto fishplated joint. That would indicate that nearly 56 sleepers had been tackled (-47 to +9), though it cannot be proved conclusively that all the sleepers had been opened out. From the replies given by the gangmen it appears that those needing attention and marked by the gangmate were opened out. In any case it appears that opening out such a stretch of sleepers (even in patches, where the % of keys loose/missing is large and spikes are loose in wooden sleepers) appears quite hazardous.

7.3.7.5 What was the rail temperature at the time of accident ?

On reaching the site of accident at about 09.30 hrs. on 18-05-94, one of the First questions I posed to the officers in charge was on this aspect. However, as it happens in such cases, I did not get any suitable reply since obviously none bothered to measure the rail temperature on reaching the site of accident, especially the engg. officials who reached the site within 1/2 hour of the accident I was told informally by DRM/JHS that there was a tremendous heat wave on the morning of 17-05-94 in that area (which he felt as JHS as well). In fact to some extent, this is corroborated by the fact that the "hot engine alarm" kept in WDM/2 loco no. 17828 was getting operative frequently (as mentioned by ALF/JHS vide para 5.5 above). On 18-05-94, at about 11.00 hrs I measured the rail temperature as 51° C, when the heat was fairly bearable. With the past records of temperature kept in this section (which I had studied carefully) and with the kind of weather described by DRM/JHS as above, I am certain that rail temperature should have been between 55°C to 60°C. The tm (mean temperature) for this region as per records is 31°C and as per para 509 (maintenance of SWR) of IRPWM 1986, regular maintenance operations should be suspended above tm +20 for Zone III & IV. As such since this site happens to be very much in Zone IV, there was no justification at all for the gang to start opening out the track at this point of time when the rail temperature was beyond tm+20.

7.3.7.6 Gaps in short welded rail

This has been earlier touched upon in para 6.4.4 above. The gap survey register kept with the PWI indicates as under :

(i) Km. 1255/4-5 to 1255/9-1256/1

Date of survey : 21-03-94

Time of survey : 16.40 to 16.50 hrs.

Rail temperature : 41° to 42°

No. of points : 14 nos

Total gap : 55mm (left) 55mm (right)

Average gap : 3.9 mm (left) 3.9mm (right)

Average gap reqd : 3mm (left) 3mm (right)

Average gap diff. : 0.9 mm (left) 0.9 (right)

Total gap diff. : 12mm (left) 12mm (right)

The above falls under case III as per para 510 of IRPWM 1986 (average gap as well as individual gaps fall within the range). Hence no adjustment is needed.

(ii) **Km. 1256 to 1257**

Date of survey : 24-03-94
 Time of survey : 10.00 hrs to 10.20 hrs.
 Rail temp : 36°C
 No. of joints : 30 nos
 Total gap : 110mm(left) 107mm (right)
 Average gap : 3.6mm (left) 3.5mm (right)
 Average gap reqd : 5.0mm (left) 5.0 mm (right)
 Average gap diff. 1.4mm (left) 1.5mm (right)
 Total gap diff. : 42mm (left) 45mm (right)

The above falls under case II as per para 510 of IRPWM 1986(average gaps falls outside the recommended range).

[Action to be taken : The joint gaps should be systematically adjusted from one end to the other end of sub section. The rails should be unfastened over convenient lengths, the gaps to be adjusted to initial laying gaps and rails fastened. In this case, introduction of a longer or a shorter rail will be involved. Efforts should be made to see that only the minimum no. of joint sleepers are disturbed].

(iii) Between km. 1256/0 to 1256/3 there are turnouts and joints and hence SWR gap measurements had not been made.

(iv) I had asked the Sectional PWI incharge specifically (vide para 5.27 above) whether after the gap survey on the above date viz. 23-3-94 he had adjusted the gaps or not for which he stated that he had *not* done so. In any case, as per para 510 of IRPWM 1986, all gap surveys and rectification should be completed before end of February (before onset of summer). As such even measurement of gap in March 94 is a violation of the above rule and further inaction on the part of p.way officials is deplorable.

7.3.7.7 What exactly was the work being done at km. 1256/0-1 on 17-05-94?

As per the initial statements of p. way officials, non was aware of what exatly was the work being done by gang at site. During investigation, it came to light that p. way mistry Shri R. K. Srivastava, (vide para 5.26 above) had send the gang no. 24 to that spot to attend to "run down jointts". He had passed on a written message to the p. way mate, which the mate Shri Pati informed, had been lost. The gang mates' daily work record indicates "जोड़ के पैकिंग सफाईहरी" which means "packing of joints and cess cleaning". The mate stated that on the above stretch of CST-9/wooden sleepers, he had marked sleepers having levels out of limits and asked the gang to pack up. He stated that only 30 sleepers were opened out. He did not issue caution order, since it was a routine job. He also stated that all fittings were intact and there was no shortfall on the above stretch (which is not true as per para 7.3.7.3 above).

It is relevant to recapitulate certain statements of non p. way officials during the inquiry as under :

(a) Shri Tejram, cabinman 'A' cabin/Ata (para 5.13 above)—Shri Ram Sumer, gangman of G. No. 24 came running to him after the mishap and told him that he warned the gangmate not to do the work without caution order, but the later did not heed his warning. In the process Shri Ram Sumer stated that he was also in trouble (Ram Sumer when called later stated that he only told Tejram that "gang man and their families are finished" and nothing else).

(b) Shri Vishwanath Singh, Pointsman/Ata (para 5.14 above) stated that while he was walking towards the site, the mate Shri Pati was asked by him, as to what work the gang was doing at the site of accident. Shri Pati, it appears told him "Don't ask now; the fault is mine". (This was denied by the mate in a confronted inquiry later).

The undisputed fact of all the eyewitnesses, still remains, that all the gangmen ran away from site and even the engg. officers who came to site at 11.45 hrs. stated that they did not see the mate or gang for quite some time. The DEN(East)/JHS stated that he saw the mate later at 14.00 hrs. only.

I'd also like to mention that at least three gangmen viz. Dhaniram, Ram Sachi & Ramsumer (witnesses at paras 5.21, 5.22 & 5.23 above) confessed that the accident affected track was attended by them on instructions given by PWI Shri M. C. Shrivastava. Probably this was done prior to arrival of ADRM/JHS & other departmental officers who reached the site by 14.45 hrs. only. The intentions of the PWI are indeed obvious!!!

7.3.7.8 Condition of track on the gang beat of Gang No. 24 (Km. 1253-1259)

A perusal of TRC charts and OMS-2000 records which reflect track geometry and riding qualities indicate the following state of track :

Date of run	Locations		Unevenness		Twist	Gauge	Speed	CTR value
	From	To	Left	Right				
12-5-94	1260	1259	B6	B10	B3	C19	75	-43
	1259	1258	B10	B7	B6	C15	60	-65
	1258	1257	BO	B6	B7	C12	60	-40
	1257	1256	B8	B5	B5	C17	65	-37
	1256	1255	C14	B5	B8	C13	75	-45
	1255	1254	C21	B9	C13	C15	80	-51
	1254	1253	D14	B8	C12	C14	75	-86
	1253	1252	B6	B3	B4	C12	75	-36
	1252	1251	C21	B2	B8	B10	75	-31
	1251	1250	C20	B4	C14	B8	80	-56

(The TRC results clearly indicate track to be in a state of average maintenance)

A close look at the TRC chart indicates unevenness peaks going upto 20 mm and beyond at several joints near the accident spot.

OMS 2000 Chart—taken on 06-12-93 at speeds upto 100 kmph indicates the following results :

Location	Vertical R.I.	Lateral R.I.	Speed Kmph	Location	Vertical R.I.	Lateral R.I.	Speed kmph
1250	2.92	3.06	102	1256	3.55	2.69	93
1251	2.75	2.98	96	1257	3.36	3.02	102
1252	3.07	2.91	97	1258	3.24	3.10	100
1253	3.19	2.97	95	1259	3.02	2.97	106
1254	3.28	3.26	87	1260	3.53	3.29	102
1255	3.06	3.02	92	—	—	—	—

[R.I.=Ride Index]

As may be seen at km. 1256 the vertical R. I. is beyond .5 (accepted limit) at a speed of 93 kmph and at the permissible speed of 100 kmph for the section, the vertical RI could be much higher and beyond acceptable limit.

It is also interesting to note from an extract of AEN/CNB's inspection note by push trolley on 23-03-94 on the above gang beat of gang no. 24 reproduced as under :—

"Gang chart of unit no. 24 was inspected. No through packing or screening has been done in the working season by the gang. PWI/Orai to submit his explanation for the lapse".

The above inspection note of AEN/CNB has not so far been replied by PWI/Orai till the time of the accident. It is obvious that the above gang did not carry out normal attention in working season from Oct. '93 till Feb. '94, stipulated in IRPWM 1986.

All the above three aspects viz. TRC, OSG and AEN's assessment have more or less clearly established beyond doubt that track maintenance on the above gang length has been neglected.

7.3.7.8 Having analysed all the relevant factors pertaining to track in paras 7.3.7.1 to 7.3.7.7 above, I would like to sum up the track defects as under :—

- (a) Large gauge variations (beyond acceptable limit) at a few sleepers just in rear of the point at which derailment process had started (para 7.3.7.2 above)
- (b) Condition of fittings viz. keys in CST-9/Wooden sleepers and spikes in wooden sleepers were quite deficient (para 7.3.7.3 above).
- (c) Suspected opening out of sleepers, much beyond permissible values and also at temperature range beyond $t_m + 20^\circ$ (para 7.3.7.4 & 7.3.7.5 above).
- (d) Gaps in short welded rails contiguous to the spot of derailment not having been surveyed and adjusted properly, which could have led to jamming of a no. of joints, vide para 6.4.5, even at lesser rail temperature, there were several jammed joints in rear of point of derailment, which would have been worse on the day of accident, when temperature would have gone upto 55°C to 60°C (para 7.3.7.6)
- (e) The gangmate might have in all probability, after opening out the ballast tried to lift the joint. Since the joints were jammed he would have naturally resorted to loosening the fish bolts and tried adjusting the gap. With the ballast resistance reduced due to opening out and with fastenings missing/loose leading to reduction of sleeper fastening resistance and with the adverse temperature prevalent at that time, any lifting could only be SUICIDAL !! That is what exactly happened when 1034 Up passed the spot when in the words of Asst. driver (who was in the left rail side on the cab which got broken into several pieces), he felt as if the whole rail had become free without any fastenings, viz a phenomena of buckling/distortion of track.

One intriguing question still persists—why did the left rail break and split into several parts and also the alignment of the track took a "bow string" shape?

In all probability, the left rail sleepers might have been opened out to a large extent and it is also seen that a large percentage of missing fittings are on the left rail side only. This could have made the left rail more vulnerable and from the description given by mate and his gang men, it appears that the left rail joint had gone down needing adjustment. As such there is every chance that the left rail would have been lifted indiscriminately, leading to the fiasco of buckling/distortion taking place. It is quite probable that left rail became free of rail seats of sleepers having lifted itself and could have been carried away by the derailing coaches and after some distance would have broken into pieces (partly due to weld failure) and thrown here and there, including a piece which went into two coaches and remaining part taking a 'S' shape across the track. What perhaps is remarkable is that none of the coaches telescoped into another (the speed of the train being 90 km/h) and coupling/train piping remaining more or less intact. Either this proves the superiority of enhanced couplings used on the train rake or the Grace of the Almighty in such serious accident !!

7.4 Cause of the accident

Having analysed all the possible factors relevant to this derailment in para 7.3 above, it is easy to arrive at the cause of the accident, which is most probably caused by a combination of the following factors :

(a) p.way gang no. 24 opening out track and lifting of track in violation of the norms laid down in IRPWM 1986 for maintenance of short welded rails.

(b) The track was in a state of neglected maintenance at site with a large percentage of fittings missing/loose and also normal maintenance schedule for welded track not being adhered to.

As such the cause of the accident is attributed to "Failure of Railway Staff".

7.5 Role of railway officials

7.5.1 Role of Shri Pati p. way mate of Gang No. 24

The above staff is 56 yrs old with 32 yrs service. He appeared much older than his age and also not fully physically fit. During the inquiry, I found it rather difficult to get cogent answers from him on many questions pertaining to track (in fact his gangman, answered more readily and clearly). I have no doubt that the gangmate was not only found wanting in knowledge of welded track, but also poor control over his men. For example, on seeing the chart showing gang attendance, he was asked as to why such a large absenteeism was prevalent in his gang, for which he expressed his helplessness. As brought out clearly in para 7.3.7.8 above, the track on his gang beat had been maintained in *neglected and rundown State*.

On the day of accident, he stated that he acted upon a note by the p.way mistry (witness at para 5.26 above) to attend to joints at km. 1256/0-1. Unfortunately, the note had been lost by him and could not be produced in the inquiry. Para 7.3 details as to what possibly could have been the work done by him. From the manner in which the left rail got twisted, bent and broken in several parts (vide photos at Annexure-II), it is clear that the rail ends have been made free while the gang was carrying out track repairs. This is also corroborated by a gangman (witness at para 5.13 above) who had told the cabinman that the work should have been done under caution order. The situation got worsened by the fact that a no. of sleepers had missing/loose fittings. The remnants of the various broken rails clearly indicate that the fittings whatever available in track had ceased to give the necessary rail sleeper hold to prevent the rails go helter skelter. An important aspect is the prevalent rail temperature, which as brought out earlier should have crossed the specified limits, beyond which track should *not* be disturbed at all.

I, therefore, hold Shri Pati, Mate of Gang No. 24 "primarily responsible" for the above accident.

7.5.2 Role of Shri R.K. Shrivastava, P. way Mistry/Kalpi

He is 41 yrs old with 19 yrs of service. He is robust and from the manner he had answered questions during inquiry seemed to be fully knowledgeable about the various maintenance aspects of welded track. Even though he is not in-charge of gang length of g. no. 24 (km. 1253 to 1254) it was on his observation, the gang was directed to work at km. 1256/0-1 on 17-05-94 to attend to rundown joints. Normally, such instructions are not uncommon, rather they do occur frequently (supervisors instructing gangs through chits of paper thrown from a train or moving vehicle to direct gangs to spots requiring immediate attention). Hence, I would not basically find anything wrong with the manner of his instruction.

What however is intriguing as that in case only joints are to be picked up, there was no need for opening out a large no. of sleepers by the gang, as has been discussed in para 7.3.7.4 above. This obviously gives an impression that the stretch 1256/0-1 might have rundown badly needing only picking up joint but also other adjustments like gap adjustments etc. Possibly all this work even though within the competence of the mate, cannot

be entrusted to only one gang with only a few gangmen and with a mate, whose competency is below par.

I'd therefore hold Shri Shrivastava "blameworthy" for the above accident, that is, he must have taken the initiative of organising this job in a better manner viz. possibly he should have stood at site himself for better direction and guidance.

7.5.3. Role of Shri N.R. Gautam, PWI (Sectional)/Kalpi

He is 38 yrs old with 11 yrs of service. He has been sectional PWI incharge of the section viz. km. 1216 to 1290. Even though he is not directly responsible for the action taken by p. way gang no. 24 on 17-05-94 at km. 1256/0-1, which led to the accident, what is of concern is that the after effects of the derailment have been disastrous, due to track in a state of rundown maintenance. He had stated in his evidence (vide para 5.27 above) that he did not discuss with the gangmen or mate of p. way gang no. 24, as to what exactly they were doing on track when he went to the accident site. This is rather strange and shows an indifferent attitude of a supervisor. He had also mentioned that the above gang beat is free of the problem of creep, fastenings complete (no theft of fittings had been reported), free from rail fractures etc. If, as per his statement there is no problem at all regarding the above aspects it only gives rise to a doubt, whether he has even trolleyed the section properly or walked by foot and opened his eyes to see what lies ahead of him. I had brought out in paras 7.3.7.3 & 6.4.2 above, the alarming proportion of missing fittings including the accident stretch also (vide Annexure-III for joint observations). As regards joint gaps on SWR track, he had only surveyed them in March 94. As per instructions contained in para 510 of IRPWM 1986, gap survey and rectification should have been done before the end of February of every year. This has been a clear omission and serious one since the track at accident spot got disturbed due to a no. of jammed joints, which would have been eliminated if sectional PWI had done his homework properly viz. all the gaps had been surveyed and adjusted before February only. Further I found that at km. 1256-1257, no gap survey had been done at all for the last decade (since no measurements were recorded on the gap survey register till Dec. 93). Shri Gautam has been PWI for more than a year and should have noticed this and rectified the register.

For all the above lapses which had led to deterioration in track, I hold Shri Gautam also responsible, though in a "secondary" role.

7.5.4. Role by Shri M.C. Shrivastava, PWI incharge/Orai

He is 39 yrs old with 20 yrs of service. He appears smartly dressed and well mannered (I also learnt that he is one of the office bearers of recognised unions at Orai). He joined rly. service in Sept. 73 and has been working, only in JHS division of C. Rly and was working as PWI Sectional of the above section from 1980 onwards and became PWI (incharge) w.e.f. Feb. 93. [He is incharge of the above section km. 1216 to 1290 for *nearly 14 years*.] Apart from questioning the above PWI during the inquiry, he also accompanied me on 21-05-94 when I trolleyed the section from Orai to Kalpi (vide para 6.4 above). I would like to sum up all his lapses as under:

- (a) His schedule of inspections has not been kept as per stipulations laid down in p. way manual.
- (b) He has not been able to bring about the necessary level of supervision and control over his gangmen. This is proved by AEN/CNB's inspection note mentioned in para 7.3.7.8 above, wherein AEN had demanded PWI's explanation for lapses on working of gang no. 24.
- (c) An important aspect on maintenance of short welded rails is that of "creep" and "joint gap survey and rectification". As regards creep, the register shows

creep as "nil" for the last 9 yrs from 1985 onwards. At site there were neither creep indicator posts nor reference marks on rail. No wonder the register is probably filled up by PWI sitting in his office and recording shown as "NIL" !! As regards gap survey he did this last on 02-03-92, when he was sectional PWI. As incharge PWI, he has not done any gap survey, at all (even though he is supposed to do once in 6 months). As regards km. 1256-1257, as mentioned earlier, the gaps were not measured till Dec. 93 since the gap survey register did not have any entry at all on the above stretch. Even though SWR has been existing in this stretch for the last 10 yrs, nobody seems to have bothered about the gap survey on this stretch at all during the last decade !! Further, even on 24-03-94 when the gap survey at km. 1256/3-1257/3 did warrant a complete adjustment of gaps, the PWI did not initiate any action at all.

- (d) During my trolley inspection on 21-05-94 (vide para 6.4 above), when I noticed a large no. of missing keys, I had asked the PWI as to the reason why keys are falling from the CST-9 plates. He tried to answer pointing out the wear on the rail seat of CST-9 plates which is heavy and which does not permit proper hold of keys. Thereafter I asked him whether (a) he had done a systematic check of rail seat wear of CST-9 plates and tried to rectify the same by properly designed saddle plates commonly used to correct this deficiency (b) he had brought this to the notice of higher officials about his need for oversized keys and if so, what are the indentations placed by him for oversized keys.

He could not answer both the questions satisfactorily. He had neither carried out an assessment of rail seat wear systematically nor has he been pressing for oversized keys. I checked up his stock position and found he has only ordinary two way keys. During my inspection, I questioned a few keymen also and found they also did not carry any keys in their kit to recoup missing fittings.

- (e) The above PWI arrived at site of accident at about 11.45 hrs. on 17-05-94 viz. within 35 minutes of the accident. From the answers given by him to me, it was clear to me that he was trying to hide certain basic facts about gang work at site, state of track etc. In fact, a few gangmen (vide paras 5.21 to 5.23) had deposed that under the instructions of the above PWI, the track at site had been attended to for rectification of certain obvious deficiencies/defects. This I consider *UNPARDONABLE*, since no damaged asset is supposed to be attended to, till proper joint observations are taken by a joint team of officials and till proper orders are given by the seniormost officer at site.
- (f) Vide para 5.28 above, the PWI refused to sign the joint observations made by a team of four supervisors, of which he was a member. Normally, at accident sites, especially at site of derailments, such disputes are bound to happen. While PWI's objections to certain measurements may be tenable as far as technical aspects are concerned, what is *not* acceptable is his reluctance to sign. As per extant instructions, he should sign with a dissent note, if need be. I consider this a serious act of irresponsibility (unfortunately the senior officers at site remained mute witnesses to this!).

In view of the various lapses mentioned above, I would consider Shri M.C. Shrivastava, as "primarily responsible" towards this accident, mainly because of his lack of supervision and control over his p. way gang no. 24 which had led to the track in a state of neglect.

7.5.5 Role of Shri M.P. Sood, AEN/Kanpur

He is 57 yrs 3 months old, with 35 yrs experience. He has been incharge of this section for the last 2 yrs. While answering questions at the inquiry, he was objective and

unbiased and took a positive approach. He was asked as to the various possibilities that could have led to the mishap and clearly *admitted* that the sole responsibility is due to track only. I must place on record my sincere appreciation of his candour and truthfulness.

However, as regards track maintenance on JHS-CNB section, I would like to mention the following lapses on his part:

- (a) He had clearly stated in reply to my query that the section did not pose any problem from the point of view of *missing fitting*, when the actual state of affairs is otherwise.
- (b) He also stated that creep is "nil" on the section and there is no problem of jammed joints. (Creep cannot be measured at all since creep indicator posts not existing at all !!).
- (c) At the accident site, being an experienced p. way man, he should have guided the PWI Shri M.C. Shrivastava to co-operate with the other supervisors. He did not play an active role in this regard.

In view of the above, I hold Shri Sood "blameworthy".

7.5.6 Role of Shri A. K. Dadariya, Divisional Engineer (East)/JHS

He is 32 yrs. old with about 5 yrs'. experience, having joined the Railways in March 1989. He has been in JHS division for the last 2 yrs and has been incharge of JHS-CNB w.e.f. Oct. 93. He was the first seniormost officer to arrive at site at 11.45 hrs. From the records of relief arrangements to passengers and other post accident restoration activities, I find his role praiseworthy, especially in view of his short length of service. However, I am not able to condone some of the lapses on his part as under:

- (a) During his last 8 months of tenure as DEN (East)/JHS he had not trolleyed even once over the above section of g. no. 24. (He is supposed to cover his section once in 6 months by push/motor trolley).
- (b) Being a senior officer at site, he should have ensured that no track is attended to before proper joint measurements are done. There is every reason to believe that attention was paid to rectifying track defects before taking joint measurement. He also did not exercise his authority over his PWI to co-operate with other supervisors in taking proper joint observations.
- (c) He accompanied me on my trolley inspection on 21-05-94. From the manner in which he was reacting to the phenomena of "missing/fallen" keys, it was obvious that he has not been fully seized with the seriousness of the problem.

I therefore hold Shri Dadariya also "blameworthy".

7.6 Could this accident have been averted?

Track at the accident spot had a large no. of missing fittings and the p. way gang also opened out track in violation of norms laid down for welded tracks. This led to obvious buckling/distortion of track under the passage of 1034 train, whose crew did not have any prewarning given to them by the p. way gang. As such this accident could not have been averted.

7.7 Other matters brought to light

7.7.1 Information to be collected at the accident spot to enable inquiry committee's for better investigation

Chapter 6 of Central Rly Accident Manual, 1984 lays down in exhaustive terms different steps to preserve the clues and other aspects relevant to subsequent investigation by inquiry committee. When I left BB VT at 14.05 hrs. on 17-05-94, I had left instructions with HQ safety branch that the "scenario at the accident site" should not be disturbed till my arrival at site. Later at about 15.00 hrs, when the train reached KYN, I was given a message from the accident site that since, main line is blocked, restoration would be delayed because of the above stipulation. I had then reconsidered and advised that a team of JA grade officers should take down all measurements relevant to the accident before start of restoration. However, when I reached the site at 09.30 hrs. on 18-05-94, I found that--

- (i) The team of JA grade officers had not made a proper study viz. track measurements were not done under "loaded" condition and proforma measurements laid down in accident manual were not adhered to.
- (ii) Even the senior supervisors' observations taken earlier prior to my instructions were not complete since PWI refused to sign.

I was therefore left with incomplete and half cooked information and I had to complete them with various other scraps of information with considerable difficulty. This could have been avoided had the seniormost official at site taken care to organise the same properly.

However, what perhaps helped me in no small measure was a "video film" taken by JHS divisional authorities covering all aspects relating to track, rolling stock and other relevant features. I must admit that my conclusions were largely based on the minute details I could gather from the above video film.

As such it is felt that C. Rly Admn should issue instructions to all divisions that prior to undertaking restoration measures at an accident site, suitable video film coverage should be arranged, wherever feasible. A divisional officer (preferably DSO) should be made in charge of directing the video film crew so that no vital clues are lost sight of.

7.7.2 Accidents at a work spot

An experienced civil engineer once remarked that in engg. deptt. the term "work spot" has become synonymous with the "vulnerable spot". He was saying this, out of sheer concern and anxiety for the large no. of accidents, which are on the rise, occurring at work-spots on several zonal rlys. As has happened at this accident, there was a p. way gang at site of accident, which was possibly carrying out a work which should not have been attempted at that time of a hot summer day.

Normally, whenever such serious accidents occur, an inconvenient but relevant question arises "what is the prima facie cause"? While prima facie cause may be obvious in certain cases, in case of derailments it often proves to be elusive even for the most seasoned and experienced railway official. There have been instructions galore on the above subject from Rly Board to all railways that the prima facie cause should be found out with least delay. Probably, one of the reasons for such urgency is to take up with the concerned departmental staff at the earliest opportunity so as to inculcate a sense of "fear of god" into the minds of erring officials/departments.

In this accident, there was considerable demur on the part of divisional authority to determine the "prima facie" cause and initiate immediate disciplinary action against the culprit rly staff viz. the p. way officials in this case. When I started the inquiry

at Orai in the evening hrs. of 18-05-94, there was a large group of press personnel who sought an exclusive appointment with me and during discussion with them, they expressed their resentment as to why no disciplinary action had been taken against any rly staff for such a serious mishap. It took considerable tact and patience on my part to explain to them of the complications of the above accident and I had to assure them that rly admn. will not spare any defaulter even if the person holds a high rank in the hierarchy.

It is therefore felt that in future when accidents occur at a workspot involving a p. way gang, disciplinary action should be initiated with the least delay against the senior-most supervisory official at site of work. GM/C.Rly may consider and issue necessary instructions in this regard.

7.7.3 Special instructions for 21 coach rake of 1033/1034

Instructions were issued in connection with augmentation of the Pushpak Express to 21 coaches by the C. Rly. Admn. vide their Joint Safety Certificate No. T/24/93/BG (Revised-II) of 11-01-94 signed by CE, CME, COM, CSTE & CEE/C. Rly. The above certificate also includes a list of spl. instructions for the above train, on which only CRS'C. Circle /Bombay had accorded his sanction vide no. 103 of 24-01-94 for running of the above train. There have been several infractions noticed during investigation :

(a) There was no telephonic communication between driver and guard (this was made mandatory while according CRS's sanction to all 21/22 coach rakes. In fact, I had brought this even earlier to the notice of GM/C.Rly vide my D.O. letter No. C-11(56)/75-259 of 04-03-94. I had discussed this issue with CSTE/C. Rly also on a few occasions, but I am rather sorry to mention that no effective action has been taken by him in this regard.

(b) The vacuum levels on this train were only 50 cms in the engine and 45 cms inn guard's brake as against stipulated level of 53 cms. in 47 cms at engine and brake respectively. This was also pointed out by the undersigned to G-M/C. Rly. vide my D.O. letter quoted above.

(c) Coaching depot officials of NE Rly/LKO C & W depot (vide para 5.9 above) were not aware that coaches have to be maintained to 110 kmph (RDSO's manual C-7103), even though the train is scheduled to run at 105 kmph only.

In addition, there were spl. instructions on JHS-CNB section about diesel loco, working of speedometers etc. Unfortunately during inquiry, I found that JHS divisional authorities have not bothered to circulate the above instructions to all concerned officials (even the safety branch of JHS division was quite ignorant of the instruction).

C. Rly Admn. should immediately reiterate the above spl. instructions to all concerned and ensure observanace by close monitoring. Similarly CME/NE Rly/Gorakhpur should ensure secondary maintenance of the rake as per instruc'tions contained in RDSO's manual C-7103.

7.7.4 Absence of pantry car in Pushpak Express

The above train is a very popular train from Bombay VT to Lucknow and vice versa, mainly in view of its lesser halts, faster travel and generally well established punctual running throughout the year. This has been one of the main reasons for increasing the coaches to 21, which I had observed personally, goes almost full, on most of the days.

However, on the day of accident, there was no pantry car attached with the result it was running with 20 coaches only. I was also subsequently informed that out of three rakes, only one rake regularly runs with pantry car, while the other two rakes have problem regarding the availability of pantry car. This is rather unfortunate, since with lesser halts and reduced time during stoppages, passengers on this train depend heavily

on the pantry car services. At the accident site, I was informed that many of the passengers had difficulty even in getting drinking water at a way side station like Ata (especially on a hot summer day as was the case on 17-05-94). This could have been lessened had there been a pantry car.

Central Rly Admn should ensure attachment of a pantry car without fail on all the rakes of 1034/1033.

7.7.5 "Dos" and "Don'ts" on welded track

A careful study and analysis into the derailments which had taken place on Indian Rlys due to "engg. staff failure" have more or less brought out a common feature viz. non-observance of "Dos" & "Don'ts" mentioned in the manuals of SWR, LWR & CWR. Various circulars had been issued from time to time on this subject. It is not that the supervisory staff or the workers under their control are not aware of the instructions; what happens generally these days is that welded track has been taken for granted viz. it is more or less "fit and forget". In the extant accident case, three main aspects are worth mention:

- (a) Opening out the track on a large no. of sleepers than what has been stipulated in the manual.
- (b) Absence of full complement of keys on CST-9 track.
- (c) Care was not exercised to suspend work at temperatures above $t_m + 20^\circ$.

While items (a) & (c) above are purely depended on p. way gang working, item (b) depends not only on keyman's patrolling and alertness, but also awareness on the part of PWI, AEN etc. on the state of "missing fittings" in their jurisdiction. Some time back the Railway Board had issued detailed instructions on "zero missing fittings gangs" (ZMFG) a system of monitoring the progress achieved by zonal rlys through monthly reports etc. This is also a regular item discussed at GMs. Conference in Rly Board's office. My personal experience with p. waymen at grass root level on the above subject however is rather painful to express. I have even heard senior officers, scoffing at this idea of "ZMFG", stating that only theoreticians sitting in the glass tower of Rail Bhawan could bring out such impractical instructions!! (I'd like to sincerely apologize if such an expression has offended the higher echelons reading this report).

There is therefore a need that not only instructions on such "Dos & Don'ts" of manual are reiterated, but the senior officers should also develop a sense of conviction in such basic aspects of track maintenance viz. the need to ensure full complement of fittings in track

7.7.6 Condition of track on Jhansi -Kanpur section

Based on my informal discussions with JHS divisional authroites and also on earlier observations on the above section, it can be stated that in JHS division, while Delhi to Bina is better maintained (which is a Shatabdi route where traffic demands a higher level of maintenance), the triangular JHS-CNB-Banda sections remain rather in a state of average to poor maintenance. On JHS—CNB section, the track is of 1957 vintage and only a stretch of 16 kms between Ait & Erich has been re-laid with MBC sleepers out of 20 kms planned. On the rest of the section, rail renewals (TRR) has been sanctioned on 49 kms of JHS-Erich section out of which 31 kms have been completed leaving a balance of 18 kms. Complete track renewal has also been planned on 6 kms. of track between Bhimsen and Govindpuri and 20.35 kms of through sleeper renewal (TSR) on various stretches on JHS—CNV section. I had discussed the subject with Chief Track Engineer, C. Rly about the future programme of track renewal on the section which have not been covered by the above proposal. As per his information, the prospects are bleak for the next three or four yrs. due to fund constraints. As such, there is a need for improved maintenance of the above section with the old track materials only. In my opinion, apart from certain "rail fracture prone" areas, there are sections where rails

are in good shape and ballast also adequate. What matters basically is the availability of fittings in CST-9 sleepers. Even here, I'd like to state that cotters are fully available generally. Hence two aspects need emphasis :

- (a) Availability of oversized keys and also moon liners/washers to enhance the tightness of keys.
- (b) A systematic study of the rail seat wear on CST-9 sleepers and provision of properly designed saddle plates.

Both the above items are very much within the powers of the Rly Admn. to plan and execute without any budgetary constraints or going through a works programmed item. I am confident with the due importance given to the above aspects, track maintenance on this section should improve considerably.

VIII. CONCLUSION

8.1 Having carefully considered the factual, material and circumstantial evidence at my disposal, I have arrived at the conclusion that the derailment of 1034 UK Lucknow-Bombay VT Pushpak Express which took place at km. 1256/0-1 on 17-05-94 between Ata and Orai stations on Jhansi-Kanpur section of Central Railway was due to distortion of track caused by track disturbance by p. way gang in charge of maintenance, in violation of the norms laid down for the short welded rails and also due to neglected and rundown state of track prevalent at site.

Accordingly, this accident is classified under the category of "Failure of Railway staff".

8.2 Responsibility

8.2.1 PRIMARY

- (a) Shri Pati, Mate of Gang No. 24

[Rules violated: G&SR 2.11(1)(a); G&SR 15.17 IRPWM para 509 (1)(2)(3), 159]

- (b) Shri M.C. Shrivastava, PWI (incharge)/Orai

[Rules violated: G&SR 15.01, 15.02(a) IRPWM paras 118(1), 124(1)(a) & (c) & (e), 125(1), 510(1), 242(3)(5), 704(1)(h), 708].

8.2.2 SECONDARY

Shri N.R. Gautam, PWI(sectional)/Kalpi

[Rules violated: G&SR 15.01, 15.02(a) IRPWM paras 124(1)(a), (c) & (e), 125(1), 136(a), 510(1), (4) & (5)].

8.2.3 BLAMEWORTHY

- (a) Shri R.K. Shrivastava, P. Way Mistry/Kalpi

[Rules violated: IRPWM para 146(j)].

- (b) Shri M.P. Sood, Assistant Engineer/Kanpur

[Rules violated: IRPWM paras 102(1), 107(8), 242(4), C. Rly's Accident Manual 1984 paras 3.21 & 6.02)].

- (c) Shri A.K. Dadariya, Divisional Engineer(East)/JHS

[Rules violated: C. Rly's Accident Manual 1984 paras 3.21 & 6.02, CE/C. Rly's Circular No. 101/1/1987 (Revised)].

[Extracts of rules violated above are given in Annexure-VIII and bio-data of the above staff are given at Annexure-IX)].

8.3 Relief measures

Relief measures and medical arrangements were quite satisfactory.

IX. REMARKS AND RECOMMENDATIONS

9.0 The recommendations given below are based on extensive remarks contained in "other matters brought to light" already dealt with in para 7.7 above which for brevity are not reproduced again.

9.1 The "Zero Missing Fitting Gang" (ZMFG) concept was started by the Railway Board a few years back with the Gandhian idealism that "track on Indian Railways should have nil/minimum missing fittings." Unfortunately, at the grass-root level the concept has not been seriously taken note of, as has been evident at the extant accident site, where track was bereft of fittings, needed for ensuring minimum safety. Rly Board should arrange to have surprise check on zonal Rlys especially on CST-9/ST sleepered track on the above aspect, which should be conducted by a team of nominated Advisors/Executive Directors drawn from engg, mechanical and safety directorates.

9.2 On several stretches of CST-9 track on JHS-CNB section the phenomena of dropping/missing of keys has reached an alarming proportion. An immediate survey should be taken of the requirement of oversized keys and moon liners/washers and procurement expedited by CE/C. Rly. Simultaneously rail seat wear should be assessed and saddle plates of various sizes supplied to p. way gangs so that insertion could be completed on a programmed basis. The above work should be monitored by safety branch officers from JHS division (Asst. officers) as well as Zonal HQ (JA grade level). Till such time action is completed for insertion of oversized keys and saddle plates on CST-9 plates, a speed restriction of 80 kmph should be imposed on stretches where CST-9 plates of 1957 vintage are available on JHS-CNB section. This is being suggested in view of the poor prospects of track renewal scheme being sanctioned in near future on this section.

9.3 With the advent of long welded rail/continuous welded rail (LWR/CWR) on the Indian Rlys, the p. way officials in zonal Rlys seem to have forgotten that "short welded rails" (SWR) also do need proper care and preventive maintenance such as measurement of creep, rail joint gap, survey and rectification, observance of temperature limits for certain p. way maintenance operations etc. A careful study of accident inquiry reports made by the Commission over the last 3 decades would indicate accidents on SWR due to non observance of the above aspects. It is suggested that the AEN (Safety) of the division along with the Safety Counsellor (Engg) should carry out a systematic check on the knowledge of the p. way mates/mistries on the above aspects and initiate suitable corrective measures.

9.4 Instructions contained in Accident Manual regarding joint measurements to be taken at site should be reiterated to all concerned. It should be ensured by the seniormost officer from the division at an accident site that all the measurements and observations are completed in all respects, before starting the restoration operations.

9.5 The Jhansi division had arranged a video film covering all the aspects of damages to track and rolling stock and other features relevant towards ascertaining the cause of the accident. Such a film had indeed proved to be of immense value to the present investigation.

Central Railway Admn. should issue instructions to all divisions that prior to undertaking restoration measures at an accident site, suitable video film coverage should be arranged, if feasible.

9.6 There has been considerable demur on the part of the divisional authorities to determine the "prima facie" cause and initiate immediate disciplinary action against the culprit railway staff. This has created an avoidable resentment amongst the media personnel, who

had expressed their sentiments on this aspect during CRS's inquiry. In future, whenever accidents occur at a work spot involving a p. way gang, disciplinary action should be initiated with the least delay against the supervisory official at site incharge of the work. GM/C, Rly may issue necessary instructions in this regard.

9.7 When the capacity of Pushap Express was increased to 21 coaches, C. Rly Admn vide their Joint Safety Certificate No. T/24/93/BG of 11-01-94 (which had been signed by CE/CSTE/CME/COM/CEE, C. Rly) had drawn a list of spl. instructions for the above train (vide CRS/Central Circle/Bombay's sanction no. 103 of 24-01-94). During the inquiry, several infractions to the above provisions in the CRS's sanction were noticed as under :

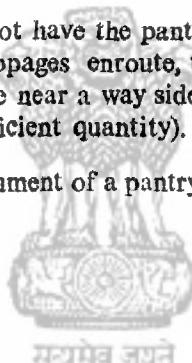
- (a) There was no telephonic communication between the driver and guard (a basic requirement on 21/22 coach rakes).
- (b) Vacuum levels both at the engine and guard's brake van being less than the levels prescribed.
- (c) The driving crew as well as diesel loco shed/JHS were not aware of the instructions on diesel loco operation on JHS-CNB section for the above 21 coach train.

C. Rly/Admn should immediately reiterate the above instructions to all concerned.

(d) Chief Mechanical Engineer/NE Rly/Gorakhpur should issue instructions to C & W depot/LKO that rakes of 1033/1034 should be maintained to standards stipulated in RDSO's Manual C-7103.

9.8 1034 Up of 17-05-94 did not have the pantry car on its formation. With a 21 coach composition and with few stoppages enroute, the absence of the pantry car was keenly felt by the passengers at the accident site near a way side station like Ata (where even potable drinking water was not available in sufficient quantity).

C. Rly Admn should ensure attachment of a pantry car without fail on all the 3 rakes of 1033/1034.



Yours faithfully,
 (Dr. M. Mani)
 Commissioner of Railway Safety,
 Central Circle, Bombay.

Bombay,
 Dated : 30-06-94



सत्यमेव जयते

LIST OF ANNEXURES

- ANNEXURE III** : Joint observations by a team of 3 JA Grade Officers at site of accident
- ANNEXURE IV** : Report of DME (Diesel)/JHS on the speed recorder of WDM/2 17828 hauling 1034 Up on 17-05-94.
- ANNEXURE V** : Joint observations on WDM/2 17828 at Jhansi Diesel Loco shed by a team of three JA Grade officers.
- ANNEXURE VI** : Joint observations on CR 92108 (1st coach of 1034 Up)
- ANNEXURE VII** : Check sheets of neutral train examiner, Matunga Workshops, C. Rly. after POH on coach nos. 92108, 8420, 92394, 92378, 9118 & 9130.
- ANNEXURE VIII** : Rules violated
- ANNEXURE IX** : Bio-data of staff (vide para 8.2 of the report)





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A. JOINT TRACK OBSERVATIONS.

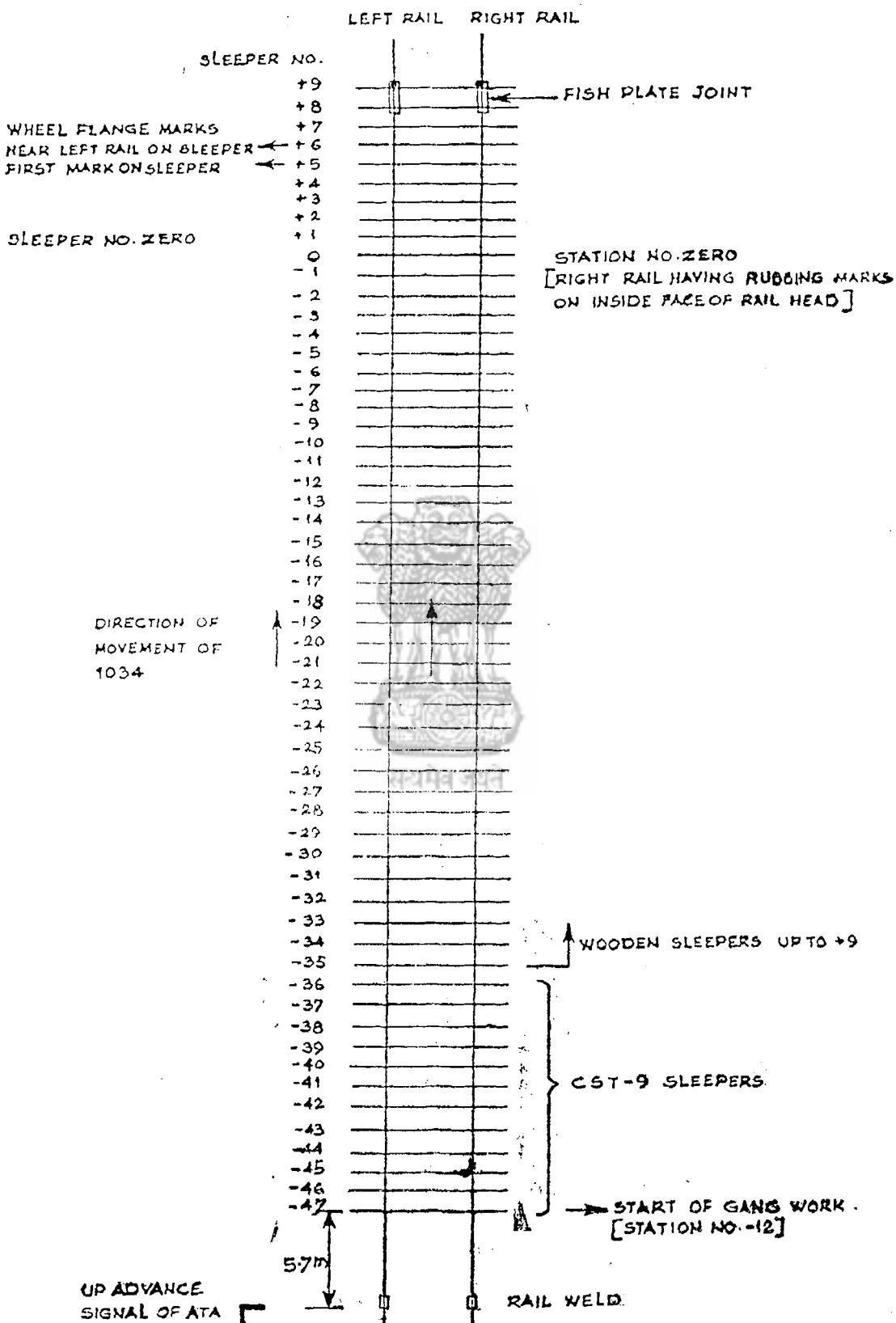
Left and right side of the rail is denoted by with reference to facing towards JHS i.e. towards the movement of 1034 Up)

Zero point has been taken as the point of drop where the first sign of wheel flange on the inside face of the right rail head.

(SEE SKETCH AT B NEXT PAGE)

Stn. No.	Track Gauge	X-Level
0	+5	-4
-1	+20	-5
-2	+4	-4
-3	0	-5
-4	0	-3
-5	-1	-4
-6	+4	-5
-7	+3	-4
-8	+2	-5
-9	-2	0
-10	0	-2
-11	0	-1

"Loaded condition"			
	Gauge	X-Level	
-12	+1	-2	+2 -4
-13	0	-2	0 -4
-14	-2	0	-2 0
-15	+2	0	+2 0
-16	+2	+1	+2 -3
-17	-1	0	+1 -3
-18	-1	-1	-1 -2
-19	+1	-3	+1 -4
-20	0	-3	+1 -4
-21	+3	0	+3 0
-22	+3	-2	+3 -3
-23	+3	-4	+3 -4
-24	+1	-2	0 -3
-25	+3	-5	+3 -5
-26	+2	-2	+2 0
-27	+1	-2	0 0
-28	+2	-2	+3 -4
-29	+2	-5	+3 -4
-30	+3	-1	+3 -2
-31	+3	-1	+3 -0
-32	+3	-2	+2 -3
-33	+2	-3	+1 -4
-34	+3	0	+3 -0
-35	+3	-1	+3 -2
-36	+3	-1	+3 -4
-37	+2	-2	+3 -3
-38	+1	-3	0 -2
-39	+3	-2	+3 -2
-40	+3	-2	+3 -2
-41	+3	-1	+3 -2

B. DETAILS OF SLEEPER NEAR POINT OF DROP

ANNEXURE III/3

JOINT OBSERVATIONS ON TRACK BETWEEN ATA-ORAI

Sleeper No.	Left rail fitting	Right rail fitting	Ballast	Sleeper type	Remarks
-+ 9	Sleeper damage spikes worked out	Rail out of position	Shifted	Wooden ACB plates round spikes	Flange marks on sleeper near left rail.
-+ 8	Sleeper cracked and one spike missing	Rail shifted all spikes broken from chair & sleeper cracked	"	"	Distance of flange mark different on sleeper No. 8 & 9 from rail foot.
-+ 7	Sleeper crack	Chair sheet damaged	"	"	--
-+ 6	Key missing	spike loose	"	"	Flange mark on sleeper near left rail
-+ 5	Spike loose	spike loose key missing	"	"	First mark on wheel flange drop on sleeper near left rail. On right rail, rubbing impression on foot of rail.
-+ 4	spike loose key loose	spike loose	"	"	--
-+ 3	spike loose	spike loose	"	"	On rail foot, ACB plate & key rub mark noticed on right rail inside.
-+ 2	spike loose	do.	"	"	do.
-+ 1	spike little loose	do.	"	"	Rubbing mark on right rail foot inside.
0	spike loose	one key missing	OK	"	Right rail rubbing mark on rail head inside face
-1	spike loose	spike loose	OK	"	--
-2	key missing	do.	OK	"	--
-3	spike loose	spike loose	OK	"	--
-4	key missing spike loose	key missing spike loose	OK	"	--
-5	key missing	key missing	OK	"	--
-6	do.	do.	OK	"	--
-7	do.	do.	OK	"	--

NOTE : Rail joint between sleeper No. -+8 & -+9 is an insulated joint with all fishplates intact. Sleeper No. -+8 & -+9 have dog spikes with canted bearing plates.

1	2	3	4	5	6
8	Key missing sleeper cracked	Key missing	shifted	wooden	Nil
9	Key missing sleeper	Intact	„	„	—
10	Sleeper cracked key missing	Key loose	„	„	—
11	Sleeper cracked	Do.	„	„	—
12	Key missing	Key missing	„	„	—
13	Intact	Intact	„	„	—
14	Key missing	Sleeper cracked & round spikes loose	OK	„	—
15	sleeper cracked	Intact	OK	„	—
16	sleeper cracked	Do.	OK	„	—
17	Key missing	Key missing	OK	„	—
18	2 round spikes loose	sleeper cracked	OK	„	—
19	Intact sleeper cracked	Intact	OK	„	—
20	Key intact	Key missing 2 round spikes loose	OK	„	—
21	Key missing	Key loose	OK	„	—
22	Key missing	Intact	OK	„	—
23	Intact	Do.	OK	„	—
24	4 spikes up	wooden sleeper cracked	shifted	„	—
25	Intact	4 spikes slightly up	OK	„	—
26	sleeper split	key missing spikes loose	shifted	„	—
27	2 round spikes slightly out	2 spikes loose key missing	„	„	—
28	Intact	Intact	„	„	—
29	Key missing	Intact	„	„	—
30	2 round spikes slightly up	2 round spikes loose	„	„	—
31	4 round spikes loose	4 round spikes slightly loose sleeper cracked	„	„	—
32	Key missing	Intact	„	„	—
33	Key loose	Key missing sleeper cracked	„	„	—
34	Intact	Intact	wooden	shifted	—
35	Intact	Key missing	„	„	—

ANNEXURE-III/5

1	2	3	4	5	6
36	Key missing	Intact	wooden	CSY-9	Nil
37	Do.	Key missing	"	"	—
38	Intact	Do.	"	"	—
39	Intact	Key loose	Ballast shifted	"	—
40	Do.	Key missing	"	"	—
41	Key missing	Intact	"	"	—
42	Do.	Intact	"	"	—
43	Do.	Intact	"	"	—
44	Do.	Intact	"	"	—
45	Intact	Key loose	"	"	—
46	"	Intact	OK	"	—
47	"	"	OK	"	—
84	Intact	1 key missing	OK	"	—
97	1 key missing	Intact	OK	"	—
101	1 key missing	"	OK	"	—
139	Intact	1 key missing	OK	"	—
153	1 key missing	Intact	OK	"	—
163	Intact	1 key missing	OK	"	—
165	Intact	1 key missing	OK	"	—

NOTE : From sleeper No. 84 to 165 the other all sleepers were intact with all fittings.

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sd/-
Sr. DME/JHS

sd/-
Sr. DEN(C)/JHS

sd/-
Sr. DSTE/JHS

Central Railway
Office of the
DME (DSL) JHS.
No. DSL. JHS. M. Misc.
dated: 22-5-94

Details of Speed recorder provided on Loco No. 17828 WDM2 when the Loco was working train No. 1034 on 17-5-94.

- (i) Type of Speed Recorder — VDO Type with seven days chart.
- (ii) S. No. of the Recorder — 30256
- (iii) Fitted on this loco — 14-5-94 with train No. 1450 UP
- (iv) Wheel Dia — 1092 mm
- (v) Dia on which meter is calibrated — 1050 mm
- (vi) Condition of watch provided on meter — The watch provided was running slow by 5'-33".
- (vii) The meter was taken out to check its accuracy on the test bench of Diesel Loco shed JHS. It was observed that the meter was showing correct speed and was also recording correctly on stationary condition. However when the meter was subjected to vibrations it was noticed that the meter was reading excess speed by 10 KMs.
- (viii) The driver of the loco has also booked that there is difference of reading between the electrical speed indicator and speed recorder.
- (ix) Chart showing speed of the loco at various times from 10.03 hrs. onwards as recorded by the speed recorder on 17-5-94 and its corresponding corrected speed.

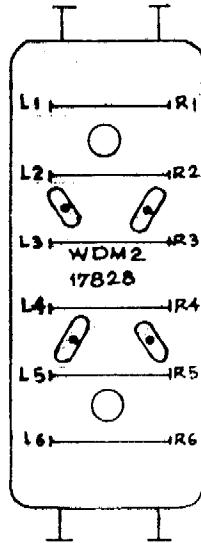
Date	Train No.	Section	Time in chart in hrs.	Actual time in hrs.	Indicated speed as on the recorder.	Corrected for the error due to vibration (to be reduced by 10 KMs.)	Corrected loco speed in K.P for 1090 Wheel Dia.
17-5-94	1034 UP	CNB-JHS	4.30	10.03	62	52	53.88
			4.35	10.08	62	52	53.88
			4.40	10.13	62	52	53.88
			4.45	10.18	90	80	82.90
			4.50	10.23	90	80	82.90
			4.55	10.28	80	70	72.53
			5.00	10.30	93	83	86.01
			5.05	10.38	84	74	76.68
			5.10	10.43	83	73	75.64
			5.15	10.48	93	83	86.01
			5.20	10.53	78	68	70.46
			5.25	10.28	90	80	82.90
			5.30	11.03	82	72	74.61
			5.34	11.07	98	88	91.19
			5.35	11.08	00	00	00.00

(P.S. Malhotra)
DME (DSL) JHS

(DALIP TAIMNI)
ADF (ENG) DSL Shed JHS.

JOINT OBSERVATIONS ON WDM 2 17828 AT
JHANSI LOCO SHED ON 19-5-94

SHORT HOOD LEADING



PARTICULARS OF LOCO

- * DATE OF COMMISSIONING - 24/03/1979
- * DATE OF LAST POH - 18/09/1990
- * DATE OF LAST 3 YEARLY SCHEDULE - 22/01/1994
- * DATE OF LAST QUARTERLY SCHEDULE - 24/04/1994
- * DATE OF LAST FORTNIGHTLY SCHEDULE - 11/05/1994
- * DATE OF LAST TRIP EXAMINATION - 14/05/1994
- * KMS EARNED SINCE LAST POH - 4,94,876 Kms

A. WHEEL DIA (MM)

L1	1092 mm	R1	1092 mm
L2	1092 mm	R2	1092 mm
L3	1092 mm	R3	1092 mm
L4	1092 mm	R4	1092 mm
L5	1092 mm	R5	1092 mm
L6	1092 mm	R6	1092 mm



B. FLANGE THICKNESS (MM)

L1	7 mm	R1	6 mm
L2	7 mm	R2	8 mm
L3	7 mm	R3	6 mm
L4	4 mm	R4	6 mm
L5	9 mm	R5	8.5 mm
L6	6 mm	R6	9 mm

C. WHEEL GAUGE AT QUARTER POINTS (MM)

AXLE NO.	MEASUREMENTS OF QUARTER POINTS				AVERAGE
	1	2	3	4	
1	1596.00	1596.50	1596.85	1597.03	1596.595
2	1596.05	1596.00	1595.30	1596.00	1595.83
3	1596.50	1596.85	1596.50	1597.00	1596.70
4	1596.55	1596.10	1596.55	1596.10	1596.32
5	1596.00	1596.20	1596.99	1596.10	1596.32
6	1595.75	1596.50	1597.85	1596.50	1596.65

D. AXLE BOX LONGITUDINAL CLEARANCE

LT SNO.15 RT	LT SNO.15 RT
.033 L1 .104"	.015 R1 .0855"
NIL .131"	.009 .0425"
.055 L2 .102"	.047 .051"
.070 .055"	.031 .029"
NIL L3 .135"	.029 R3 .053"
.055 .079"	.037 .038"
.005 L4 .123"	NIL R4 .2305"
.093 .028"	.027 .1575"
.023 L5 .127"	.007 R5 .175"
.070 .093"	.113 .045"
.005 L6 .059"	NIL R6 .143"
.021 .132"	.110 NIL

E. AXLE BOX LATERAL CLEARANCE

LT SNO.15 RT	LT SNO.14 RT
.419 L1 .419"	.333 R1 .220"
.656 L2 .656"	.455 R2 .510"
.325 L3 .644"	.233 R3 .509"
.316 L4 .302"	(.2895) R4 .1685"
.584 L5 .596"	(.4835) R5 .433"
.230 L6 .2535"	.2535 R6 .5325"

F. SPRINGS (HEIGHT OF COIL SPRINGS IN MM)

INNER		OUTER		NOTE -
LEFT	RIGHT	LEFT	RIGHT	
* 450 1	422	453 1	450	ALL NEW SPRINGS WERE
418 2	450 *	453 2	450	FITTED IN 3 YEARLY SCHEDULE
* 457 3	426	457 3	450	IN JAN.94.
425 4	446 *	448 4	456	
* 446 5	422	459 5	457	
420 6	445 *	454 6	458	
* 449 7	418	458 7	456	
428 8	445 *	454 8	457	

* ← SNUBBER

G. BUFFER HEIGHTS

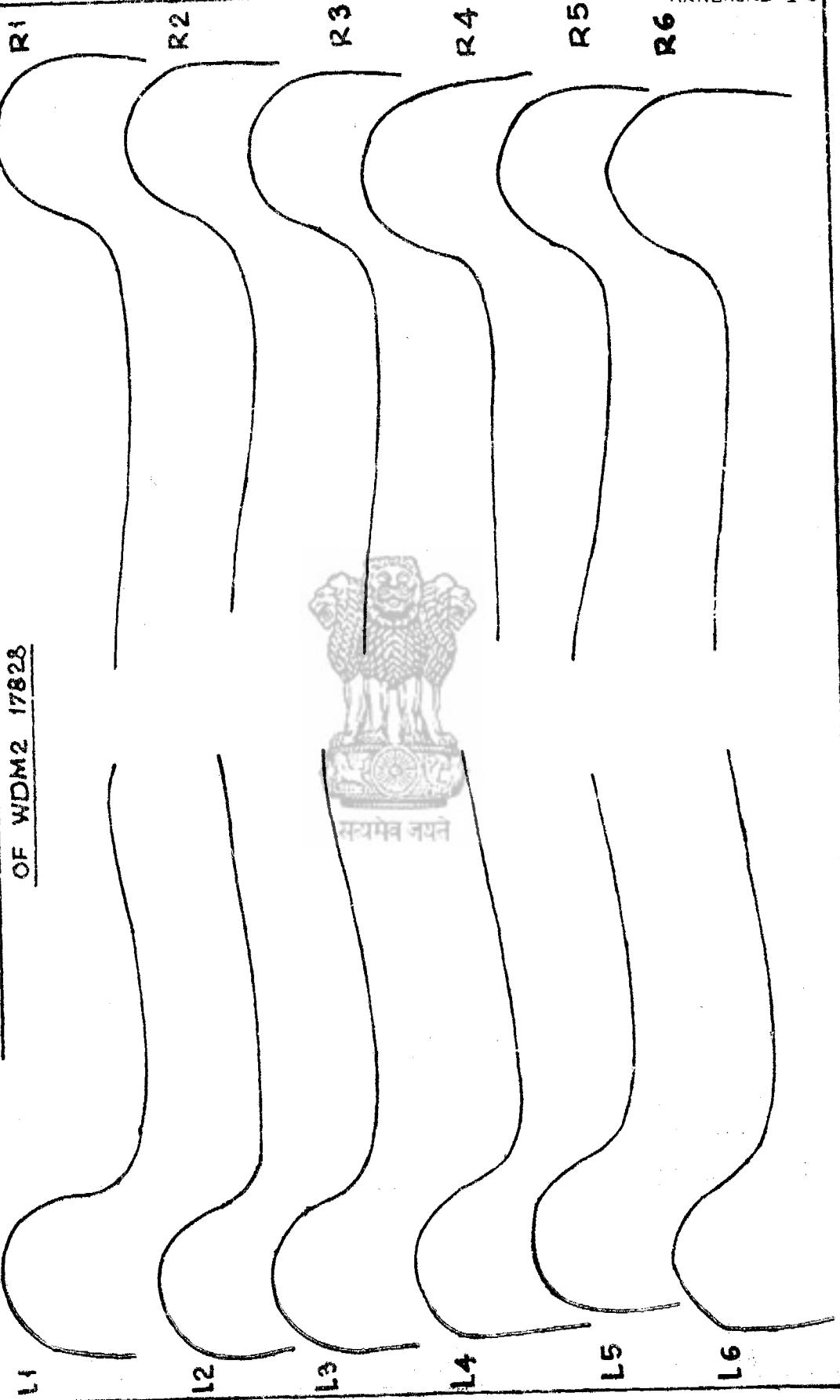
ENGINE FRONT (RIGHT)	- 1030 mm
ENGINE FRONT (LEFT)	- 1037 mm
ENGINE REAR (RIGHT)	- 1025 mm → 3 NUTS MISSING AND ONE BOLT BENT
ENGINE REAR (LEFT)	- 1052 mm.

H. OTHER OBSERVATIONS.**(a) SIDE BEARERS**

RIGHT HAND SIDE BEARER - IN BOTH FRONT & REAR, THE OIL WAS LESS. THERE WAS 2 mm OIL BELOW LINER (IN THE FRONT ONE) AND 12 mm ABOVE LINER (IN THE REAR ONE). LEFT HAND SIDE BEARER - OIL LEVEL BELOW LINER WAS 1 mm ON REAR SIDE BRONZE LINERS IN RIGHT SIDE BEARER (BOTH LEADING & TRAILING) WERE FOUND BROKEN IN SEVERAL PLACES.

sd/-
SR. DME/JHSsd/-
SR. DEN/JHSsd/-
SR. DSTE/JHS

WHEEL PROFILE MEASUREMENT
OF WDM 2 17828



ANNEXURE - VI - 1

**JOINT OBSERVATIONS ON SLR CR 92108 (1ST COACH
NEXT TO ENGINE OF 1074 UP)**

A. BIODATA.

TROLLEY OF ICF MAKE BUILT IN 1991 } BUILT AT RCF/
BODY OF BEML MAKE BUILT IN 1992 } KAPURTHALA.
DATE OF COMMISSIONING 1992
LAST POH AT MATUNGA SHOP C.R.LY 29/9/93
DATE OF RETURN 12/94
A' SCHEDULE DUE AT MAZGAON
C.R.LY 15/4/94.

B. WHEEL SET MEASUREMENT

i) WHEEL GAUGE OF QUARTER POINTS (MM)

BOMBAY END TROLLEY	DELHI END TROLLEY
LEADING	LEADING
1599.47	1599.54
1599.57	1599.57
1599.76	1600.12
1599.65	1600.32
1599.75	1598.67
1598.30	1598.85
1598.65	1598.65
1599.10	



ii) WHEEL FLANGE THICKNESS (MM)

LR	LR
24	27
LL	LL
25	27.5
TR	TR
26	28
TL	TL
27	28

C. BUFFER HEIGHTS.

LR. 1067 MM TR. 1072 MM
LL 1062 MM TL 1062 MM

D. BOTH TROLLEY PIVOTS ARE OK, WITH SMALL GRAZING IN PIVOT HOUSING

E. WHEEL PROFILES SEE ANNEXURE - VI - 2

sd/-
SR.DME

sd/-
SR.DEN

sd/-
SR.DSTE

ANNEXURE-VI-2

WHEEL PROFILE BB END TROLLEY(LEADING)CR-92108
SLRBB END LEADING RIGHTBB END LEADING LEFTBB END TRAILING RIGHTBB END TRAILING LEFTWHEEL PROFILE DLI END TROLLEY(LEADING)DLI END TRAILING RIGHTDLI END TRAILING LEFTDLI END LEADING LEFTDLI END LEADING RIGHT

राष्ट्रसंग्रहालय

- OBSERVATION →
 1) GRAZING MARK ON ALL TYRE & FLANGE
 2) DLI END TRAILING RIGHT WHEEL FLANGE HAVING FRESH
 CUT MARK OF SIZE 90mmx10mm X 8mm AND TYRE HAVING OLD
 CUT SIZE 26x12mm² DEPTH 0.6MM

Sd/-
SR. DME

- OBSERVATION →
 1) GRAZING MARK ON ALL TYRE & FLANGE
 2) DLI END TRAILING LEFT SIDE HEAVY CUT
 ON FLANGE

Sd/-
SR. DENSd/-
SR. DSTE

(in 6 pages)

**NEUTRAL TXR/MATUNGA/CENTRAL RAILWAY'S INSPECTION AFTER
POH OF COACHES**

CHECK SHEET

Coach No. 92108

Year Built 1992

Speed 110

Code No. SLR

R/Date 10/94

Provided : SAB & DAV Yes

POH Date
Tare Weight4/9/93
37.5

Sl. No.	Description	KYN		BB	
		East	West	East	West
1	2	3	4	5	6
1.	Buffer Height	1100	1100	1105	1105
2.	Buffer face radius wear	Nil	Nil	Nil	Nil
3.	Buffer Length	635	635	635	635
4.	Wheel Dia 915—819	850 S	850 S	848 S	843 S
5.	Wheel distance	1599.5	1599	1600	1599
6.	Bogie Rail Height	695	695	697	695
7.	Axle Box Spg. Height	280/280 280/285	282/282 280/280	280/280	280/280 280/285
8.	Axle Box housing	55/55	55/55	55/55	55/55
9.	Bolster Spring Height	300 300	300	300	300
10.	ICF Bolster clearance	45/43	45/45	45/45	43/45
11.	BEML Body Clearance	135	138	140	135
12.	BEML modification				
13.	Vacuum Test stroke				
14.	Vertical shock absorber			POH	POH
15.	Swing links			Nom	Nom
16.	Dynamo height				

CHECK SHEET

Coach No. 8420

Year Built 1987

Speed 110

Code No. GS

R/Date 6/95

Provided : SAB & DAV Yes

POH Date 3/5/94

Tare Weight 37.8

Sl. No.	Description	KYN		BB	
		East	West	East	West
1	2	3	4	5	6
1.	Buffer Height	1105	1100	1105	1105
2.	Buffer face radius wear	Nil	Nil	Nil	Nil
3.	Buffer Length	635	635	635	635
4.	Wheel Dia 915—819	842 S	840 S	835 S	835 S
5.	Wheel distance	1600.5	1601	1601	1600.5
6.	Bogie Rail Height	697	697	697	697
7.	Axle Box Spg. Height	282/282 287/285	283/283 280/283	282/282	285/287 282/282
8.	Axle Box Housing	52/52	52/52	52/55	55/55
9.	Bolster Spring Height	300 300	300	300	300
10.	ICF Bolster clearance	40/40	42/42	40/40	40/40
11.	BEML Body Clearance	65	60	65	63
12.	BEML modification				
13.	Vacuum Test stroke				
14.	Vertical shock absorber		New	New	New
15.	Swing links				
16.	Dynamo height	330			
17.	A/box packing	75/75 75/75	75/75	60/60	80/80 80/80

ANNEXURE VII—Contd.

CHECK SHEET

Coach No. 92394

Year Built 1992

Speed 110

Code No. GS

R/Date 10/94

Provided : SAB & DAV Yes

POH Date 20/9/93

Tare Weight 37.2

S. No.	Description	KYN		BB	
		East	West	East	West
1	2	3	4	5	6
1.	Buffer Height	1105	1105	1105	1105
2.	Buffer face radius wear	Nil	Nil	Nil	Nil
3.	Buffer Length	635	635	635	635
4.	Wheel Dia 915-819	895 T	895 S	890 S	890 S
5.	Wheel distance	1600	1600	1600	1600
6.	Bogie Rail Height	700	700	700	700
7.	Axle Box Spg. Height	285/285 280/280	285/285 285/287	287/287 285/280	280/283 285/287
8.	Axle Box housing	55/55	55/55	55/55	55/55
9.	Bolster Spring Height	300 300	300 300	300	300
10.	ICF Bolster clearance	35/35	35/36	38/35	37/36
11.	BEML Body clearance	68	67	65	68
12.	BEML modification				
13.	Vacuum Test stroke				
14.	Vertical shock absorber			POH	POH
15.	Swing links			POH	POH
16.	Dynamo height			POH	POH

CHECK SHEET

Coach No. 92378

Year Built 1992

Speed 110

Code No. GS

R/Date 4/95

Provided : SAB & DAV Yes

POH Date 21-3-94

Tare Weight 37.2

S. No.	Description	संयमन जप्तन		KYN		BB	
		East	West	East	West	East	West
1	2	3	4	5	6		
1.	Buffer Height	1105	1105	1105	1105		
2.	Buffer face radius wear	Nil	Nil	Nil	Nil		
3.	Buffer Length	635	635	635	635		
4.	Wheel Dia 915-819	915 S	915 S	915 S	915 S		
5.	Wheel distance	1600	1600.5	1600	1600		
6.	Bogie Rail Height	695	695	695	695		
7.	Axle Box Spg. Height	287/287 285/285	285/285 285/290	285/285	280/285		
8.	Axle Box housing	55/55	55/55	55/55	55/55		
9.	Bolster Spring Height	300 300	300 300	300	300		
10.	ICF Bolster clearance	40/40	40/40	40/40	45/45		
11.	BEML Body Clearance	65	65	65	60		
12.	BEML modification						
13.	Vacuum Test stroke						
14.	Vertical shock absorber			Nom	Nom	Nom	Nom
15.	Swing links						
16.	Dynamo height						
17.	A/box packing	45/45 45/45	45/45 45/45	45/45	45/45		

ANNEXURE VII—(Contd.)

CHECK SHEET

Coach No. 9118	Code No. WGSCN	POH Date 17-1-94	
Year Built 1974	R/Date 2/95	Tare Weight 40.4	
Speed 110	Provided : SAB & DAV Yes		
S. No.	Description	KYN	BB
		East	West
1. Buffer Height	1090	1095	1100
2. Buffer face radius wear	Nil	Nil	Nil
3. Buffer Length	635	635	635
4. Wheel Dia 915-819	890 S	890 S	890 S
5. Wheel distance	1599	1600	1601.5
6. Bogie Rail Height	690	690	695
7. Axle Box Spg. Height	280/280	280/280	280/280
	275/280	280/275	275/275
8. Axle Box housing	55/55	55/55	55/55
9. Bolster Spring Height	300	300	300
	300	300	300
10. ICF Bolster clearance	40/40	42/43	38/38
11. BEML Body Clearance	65	63	68
12. BEML modification			
13. Vacuum Test Stroke			
14. Vertical Shock Absorber	Nom	Nom	Nom
15. Swing links			
16. Dynamo height			

CHECK SHEET

Coach No. 91307	Code No. WGSCN	POH Date 18-4-94	
Year Built 1991	R/Date 5/95	Tare Weight 39.5	
Speed 110	Provided : SAB & DAV Yes		
S. No.	Description	KYN	BB
		East	West
1. Buffer Height	1100	1100	1105
2. Buffer face radius wear	Nil	Nil	Nil
3. Buffer Length	635	635	635
4. Wheel Dia 915-819	875 S	872 T	875 S
5. Wheel Distance	1600	1600	1600
6. Bogie Rail Height	695	695	697
7. Axle Box Spg. Height	280/280	270/270	280/280
	285/285	270/270	280/275
8. Axle Box Housing	55/55	55/55	55/55
9. Bolster Spring Height	300	300	300
	300	300	300
10. ICF Bolster Clearance	38/35	40/40	38/42
11. BEML Body Clearance	67	65	65
12. BEML Modification			
13. Vacuum Test Stroke			
14. Vertical Shock Absorber	Nom	Nom	POH
15. Swing links			
16. Dynamo Height			
17. A/Box Packing	65/65	70/70	65/65
	65/65	70/70	65/65

RULES VIOLATED

(A) GENERAL & SUBSIDIARY RULES

GR 2.11(1)(a) : Every railway servant shall see that every exertion is made for ensuring the safety of the public.

GR 15.01 : Condition of Permanent way—Each inspector of way shall be responsible for the condition of the permanent way under his charge.

GR 15.02 (a) : Each inspector of way shall see that the length of line in his charge is efficiently maintained.

GR 15.17 : Duties of gangmate when apprehending danger—If a gangmate considers that the line is likely to be rendered unsafe or that any train is likely to be endangered in consequence of any defect in the way, he shall take immediate steps for securing the stability of the line and safety of trains, by using the prescribed signals for trains to proceed with caution or to stop as necessity may require.

(B) Central Railway's Accident Manual¹, 1984.

Para 3.21—Preservation of clues : It is very necessary to preserve all clues as far as possible for helping the Commissioner of Railway Safety, as even an apparently unimportant clue may give him some useful information as to the likely cause of accident. The clearance should ordinarily be limited to the removal of dead bodies and injures persons from the debris, if any, and wherever feasible in the case of all serious accidents, communications may be restored by laying a diversion, so that the Commissioner of Railway Safety, may have the benefit of personal examination of the site of accident undisturbed. In any individual case where the circumstance compel the removal of debris, in part or whole, before the arrival of Commissioner of Railway Safety at site, complete and detailed notes should be recorded by the seniormost officer present of the observations made by the various officers, before issue of such orders. These notes should be given to the Commissioner of Railway Safety on arrival. All sleepers, rails and other fittings removed from the site should be carefully preserved for inspection by the Commissioner of Railway Safety.

Para 6.02 : Information to be collected on the spot to facilitate inquiry committee to arrive at the cause of the accident—After every accident, certain vital information bearing on the cause of the accident is to be collected on the spot which later may not be available on account of clearance operations undertaken and the resumption of normal traffic. Due to failure to collect such information, it often becomes difficult for the inquiry committee to ascertain the cause of the accident. Supervisory officials available on the spot or arriving at the scene of the accident should ensure that such information as would be required for the inquiry committee to arrive at the cause of the accident should be collected before clearing operations are started.

In the case of derailments, track measurements should be taken and sketch should be prepared in accordance with instructions given in paras 5 & 7 of CE's circular no. 12.

(C) Indian Railway's P. Way Manual, 1986

Para 102(a) : Essential duties of an Asst. Engineer—Inspection and maintenance of track in a satisfactory and safe condition.

Para 107(8): Scrutiny of registers during inspection—He should scrutinise all important registers including creep registers, gap survey register to see whether schedule of inspection are being adhered to by the inspectors, and whether the necessary follow up action has been taken.

Para 118(1) : P. way inspector is generally responsible for “maintenance and Inspection” of track in a satisfactory and in a safe condition for traffic.

Para 124(1): Routine inspection of track—Inspection of gangs:

(a) The permanent way inspector should inspect the entire section by push trolley at least once in a fortnight or more often as necessary.

(b) XXX XXX XXX

(c) During such inspections the permanent way inspector should—

(ii) arrange to give the programme of work to the gang.

(d) XXX XXX XXX

(e) He should ensure that every man in the gang is aware of safety rules by examining them periodically.

Para 125(1): The p. way inspector is directly responsible for the safety of the track. He should be vigilant to locate faults in the p. way and promptly remedy them.

Track defects which are beyond his powers to remedy should be immediately brought to the Asst. Engineer's notice by the p. way inspector and mention of the same made in special reports on the condition of the p. way on the section.

Para 136(a) : The PWI (sectional) is responsible for inspection and maintenance of track in his jurisdiction in a safe and satisfactory condition for traffic, including executing of all works incidental to track maintenance.

Para 146 : Duties of permanent way mstries—

They are normally incharge of items of work which require a higher level of supervision than can be exercised by gangmate. They will carry out the following items of work :

(i) Attend to bad spots.

Para 510 : Gap survey and adjustment of gap—

(1) Gap survey and rectification of gaps is to be carried out, in stretches where track develops excessive creep, jammed joints, sometimes buckling etc. In SWR, gap survey and adjustment should normally be done before the end of Feb. once a year (i.e. before onset of summer).

(4) Calculation for adjustment

A comparison of the results of the gap measurements recorded and the permissible values of gap will lead to one of the following cases :

Case 1 : Average gap is within the recommended range, but source of individual gap fall outside the range.

Case 2 : Average gap falls outside the recommended range.

Case 3 : Average gap as well as individual gap fall within the range.

(5) Action to be taken

Case 1 : Rectification work should be restricted to correcting the individual gaps which fall outside the recommended range.

Case 2 : Joints gaps should be systematically adjusted from one end to the other end of the subsection.

Case 3 : No action is to be taken.

Para 242(3) : For reducing creep, it must be ensured that rails are held firmly to sleepers and all keys and spikes driven home. Careful watch should be kept for a series of jammed joints. In case of SWR, not more than two jammed joints should be permitted at rail temperatures less than $tm + 5^\circ$ in case of Zones III & IV.

(4) Creep register Asst. Engineer should test check the register frequently.

(5) Creep indicator posts square to track should be erected on either side of track on the cess at intervals of 1 km.

Para 704(i) : Action at site by p.way inspectors—

(h) Preservation of clues—He should arrange to preserve clues to enable reconstruction of the scene of the accident.

Para 708—Recording particulars at site of accident :

Permanent way particulars should be recorded jointly with the inspectors of the concerned depmts. as per prescribed proforma. These records will "inter alia" include particulars of the track structure, condition of track components, track geometry and other relevant details.

(D) Chief Engineer/C. Rly's Circular No. 101/1/1987 (Revised) on "Schedule of Inspection"

By trolley :

Route group A, B, C & D :

Inspection by DEN/Sr. DEN once in six months (instead of quarterly stipulated earlier)

Once in six months (instead of four months).

Route group E :

BIO-DATA OF STAFF INVOLVED

1. Shri Pati, S/o Shri Mathura, P. Way Mate

(a) Date of birth	19-11-1937
(b) Date of appointment	19-02-1961
(c) Appointed as	As gangman
(d) Date of promotion	14-09-83 (as keyman) 01-04-88 (as mate)
(e) Grade with pay	Rs. 950-1500 (RPS) Pay Rs. 1200/-
(f) Educational qualification	Nil
(g) Punishment if any	Nil
(h) Rewards if any	Nil

2. Shri M.C. Shrivastava, PWI/Orai

(a) Date of birth	06-01-1955
(b) Date of appointment	12-09-1973
(c) Appointed as	PWI(Grade-III)
(d) Date of promotion	Nov. 84 (PWI Gr. II) 28-04-93 (PWI Gr. I)
(e) Grade with pay	Rs. 2000-3200 (RPS) Pay Rs. 2180/-
(f) Educational qualification	B.Sc.
(g) Punishment if any	Nil upto 15-05-94. 2 sets of passes with held during 1994
(h) Rewards if any	Has received commendation certificates and awards in the past.

3. Shri N.R. Gautam, PWI/Kalpi

(a) Date of birth	04-07-1956
(b) Date of appointment	04-06-1983
(c) Appointed as	PWI Gr. III
(d) Date of promotion	31-01-92 (as PWI Gr. II)
(e) Grade with pay	Rs. 1600-2620 (RPS) Pay Rs. 1850/-
(f) Educational qualification	Intermediate and Diploma in Elect. Engg.
(g) Punishment if any	2 increments stoped for 1 year non cumulative on a/c of accident at BSL division.
(h) Rewards if any	Rs. 150/- awarded during 1989 at CKTD relaying.

4. Shri R.K. Shrivastava, P. way Mistry/Kalpi

(a) Date of birth	01-07-1953
(b) Date of appointment	19-07-1975
(c) Appointed as	Casual Labour
(d) Promoted as	16-09-78 (as gangman) 02-02-85 (as PWM)
(e) Grade with pay	Rs. 1400-2300 (RPS) Pay Rs. 1760/-
(f) Educational qualification	High School
(g) Punishment if any	Nil
(h) Reward if any	Nil

5. Shri M.P. Sood, Assistant Engineer/Kanpur

(a) Date of Birth	13-03-1937
(b) Date of appointment	04-05-1959
(c) Appointed as	Apprentice PWI
(d) Date of promotion	
(e)	Pay Rs. 3500/-
(f)	
(g)	
(h)	on letters several times

6. Shri

- (a)
- (b)
- (c) .
- (d) :
- (e) C
- (f) E
- (g) P
- (h) R

